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SOLID ROCKET PLANT



Weapon System 133A

FINAL REPORT

QUALIFICATION TEST REPORT FOR STATHAM ABSOLUTE PRESSURE TRANSDUCER

Contract No. AF 33(600)-36610

Report 0162-01DR-26

27 December 1963

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AEROJET-GENERAL CORPORATION

SACRAMENTO, CALIFORNIA

FINAL REPORT

QUALIFICATION TEST REPORT FOR STATHAM ABSOLUTE PRESSURE TRANSDUCER

WEAPON SYSTEM 133A

Contract No. AF 33(600)-36610 Contract Change Notification No. 233

Prepared for

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Minuteman Program

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I. INTRODUCTION

This report describes the results of the qualification tests that were conducted or Statham Instruments absolute pressure transducer Model PA334TC-2.5M in accordance with Aerojet-General Specification 32060A Type II.

II. SUMMARY

Five Statham Instruments absolute pressure transducers Model PA334TC-2.5M were subjected to the tests as described in Appendix A. A part of the qualification test requirements were satisfied on the basis of similarity to absolute pressure transducer Model PA334TC-750 which was previously qualified as described in Report 0162-01DR-22.

III, TEST PROGRAM

Absolute pressure transducers, SN 447, 487, 491, 493, and 703, were subjected to performance, frequency response, motor static firing, and safety reliability tests. Remainder of the qualification tests including vibration, acceleration, temperature-altitude, altitude, humidity, hermetic seal, radio-frequency interference, and performance reliability were performed on transducer Model PA334TC-750 and are considered applicable to Model PA334TC-2.5M based on the similarity of the two parts.

The pressure transducer tests conducted at Aerojet are as follows,

A. PERFORMANCE (CALIBRATION)

Each transducer was subjected to pre- and posttest calibration after each qualification test. The tests were conducted to determine insulation resistance, circuit isolation, primary power

current, linearity, hysteresis, repeatability, zero output, full-scale output, temperature effects, output of 150% full-scale (FS) pressure (voltage limiting), residual noise at FS pressure and shunt calibration.

B. FREQUENCY RESPONSE

For the frequency response tests transducers SN 487 and 703 were subjected to pressure shocks while mounted in the expansion section of a shock tube. The results, including pre- and posttest performance data, are as shown in Appendix A.

C. MOTOR AND IGNITER FIRINGS

Transducer SN 493, 703, and 477 were tested on five static firings of Minuteman second-stage motors. SN 493 and 703 were used in two tests and SN 477 was used in one test. Data obtained from these tests were compared with output data of a reference pressure transducer used for measuring chamber pressure during motor static firings. Prior to and following each test the transducers were subjected to performance tests and the results are shown in Appendix A.

Transducers SN 493 and 477 were subjected to five igniter firings. The results from the igniter firings and the pre- and posttest calibrations are shown in Appendix A.

D. SAFETY RELIABILITY

Safety reliability tests were conducted on two transducer housings to verify structural integrity of the units.

IV. CONCLUSIONS

Successful completion of the qualification tests conducted on Statham absolute pressure transducer Model PA334TC-2.5, SN 447, 487, 491, 493, and 703; have qualified the transducer for use on second-stage Minuteman motors.

Appendix A

QUALIFICATION AND RELIABILITY TEST
REPORT FOR STATHAM ABSOLUTE PRESSURE TRANSDUCER

Appendix A

QUALIFICATION AND RELIABILITY TEST
REPORT FOR STATHAM ABSOLUTE PRESSURE TRANSDUCER

Appendix A

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1.0 Object

The purpose of this program was to determine compliance of Statham Instruments Model PA334TC-2.5M pressure transducer with the requirements set forth in Paragraph 2.0.

2.0 Test Requirements

Perform qualification tests (Pre-production and Reliability) on Statham Instruments Model PA334TC-2.5M pressure transducer to verify compliance with design requirements of Aerojet-General Component Specification 32060A Type II. Unless otherwise indicated; paragraph numbers referenced in this Report are those of the Aerojet-General Corporation Specification.

3.0 Description of Test Specimens

Five Statham Model PA334TC-2.5M pressure transducers were submitted for tests as described above. Three were used for frequency response tests and two for safety tests and motor static test firings. The specimens were arbitrarily assigned numbers as follows:

Serial No.	Specimen No.
477	1
493	2
703	3
491	4
487	5

4.0 Conclusion

4.1 Qualification Testing

The transducers were subjected to the test program as required. The transducers complied with all requirements of the specification based on tests performed and on the basis

of similarity to the Statham Model PA3345C-750 previously qualified to Aerojet Specification 32060 Type I. Each test is so indicated where similarity is used as a basis for qualification. For details of these tests see Aerojet Report 0162-01DR-22, "Qualification Test Report for Statham Operational Pressure Transducer and CTLI Pressure Measuring System".

5.0 Test Procedures and Results

5.1 Examination of Product

Test by: R. E. Leeds

Test started: 3 Mar 63

Test completed: 3 Mar 63

5.1.1 Test Requirement

Aerojet-General Corporation Specification 32060A. Paragraphs 3.6.1, 3.6.2 and 3.7. Specimens 1 through 5.

Examination: Visual and manual.

5.1.2 Test Method

The pressure transducers were examined visually to determine compliance with engraving, finish, and workmanship. The pressure transducers were manually measured to determine dimensional and weight compliance with the specification.

5.1.3 Test Results

Visual: The transducers conformed to all visual requirements relating to marking, cleanliness, workmanship, and general appearance.

Manual: Results of the dimensional measurements are presented in Figures 1 and 2.

Comments: Dimensional measurements and weight of the transducers complied with the specification requirements.

5.1.4 Test Equipment

- 5.1.4.1 Calipers
- 5.1.4.2 Tragkraft, Mikro Doft Scales

5,2 Performance

5.2.1 Insulation Resistance and Excitation Circuit Isolation

Test by: Dept. 8772

Test started: 5 Dec 62

Test completed: 5 Dec 62

5.2.1.1 Test Requirement

Aerojet-General Corporation Specification 32060A, Paragraphs 3.3.13.1 and 3.3.13.2. Specimen No's. 1, 2, 3, 4, and 5

Insulation Resistance: 1 megohm minimum at 50 v dc Excitation Isolation: 1 megohm minimum at 50 v dc

5.2.1.2 Test Method

The insulation resistance between all connector pins and the transducer case was measured at $50\ v$ dc. The excitation isolation was measured between pins A and D and output pins B and C.

5.2.1.3 Test Results

The transducers complied with all test requirements of paragraph 5.2.1.1. Data and test results are shown in Figure 3.

5.2.1.4 Test Equipment

5.2.1.4.1 Insulation Tester

5.2.2 Output Impedance

5.2 Performance

5.2.2.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.3.15.

Output Impedance: 1000 ohms maximum.

5.2.2.2 Test Method

This test not required since the unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060, Paragraph 4.4.3.

5.2.3 Bridge Excitation Power Supply

5.2.3.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.3.16.

Excitation Current: Less than 70 milliamperes at 28 + 2 v dc.

5.2.3.2 Test Method

This test not required since the unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060 Paragraph 4.4.3.

5.2.4 Recovery from Primary Power Transients

5.2.4.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.3.17.

Transient Amplitude: 45 v dc

Transient Duration: 500 millisec

5.2 Performance

Output Amplitude Change, 150 millivolts (P-P) maximum
Output Amplitude Change Duration: 50 millisec maximum

5.2.4.2 Test Method

This test was not required since the unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060. Paragraph 4.4.3.

5,2,5 Noise (Broad band)

5.2.5.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.3.3.

Output (broad band) noise: Less than 25 millivolts peak to peak.

5.2.5.2 Test Method

This test was not required since the unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification,

Paragraph 4.4.3.

NOTE: A noise test is performed on all transducers during receiving inspection.

5.2.6 Functional Calibration

Test by Dept 8772

Test started 5 Dec 62

Test completed 5 Dec 62

5.2.6 l Test Requirement

Aerojet-General Corporation Specification 32060. Paragraphs 3.3.2, 3.3.2.2 3.3.4, 3.3.5, 3.3.12.6.3 and 3.3.14.

5.2 Performance

Excitation: 28 v dc

Pressure: 0 to 2500 psig, 3 calibration cycles Zero Output Voltage: Output voltage at 0.1 psia

5.2.6.2 Test Method

The pressure port of the transducer was connected to a dead weight pressure system capable of producing pressure variation from 0 psig to 2500 psig. For verification of zero output voltage the pressure system incorporated a cacuum pump to produce pressures below atmospheric. The transducer was energized with 28 v dc. A calibration cycle consisted of 11 pressure points taken in 500 psig increments from 0 psig increasing to 2500 psig and decreasing to 0 psig. Three calibration cycles were performed.

Upon completion of each of the three calibration cycles, the zero balance was recorded at less than 0.1 psia. A simulated pressure calibration was performed at the completion of the three cycles. After each calibration cycle, the data was interpreted for non-linearity, hysteresis, repeatability, full scale output voltage, zero output voltage and simulated pressure calibration accuracy.

5.2.6.3 Test Results

The transducers complied with all test requirements of Paragraph 5.2.6.1. Figures 5 through 9 show test results. The definitions used in the data reduction and presentation of results are as described in Paragraph 6.3 of Aerojet specification 32060.

Apperdix A

5.2 Performance

5.2 6 4 Test Equipment

- 5,2,6,4.1 Amthor Dead Weight Tester, Model 460
- 5.2.6.4.2 Power Supply-Kay Lab Absolute d c PN 110-542-200-1
- 5.2.6.4.3 Alirco Type C Calibrator PN 0-220907
- 5.2.6.4.4 Micron Gauge CVC Model 321-T
- 5.2.6.4.5 Vacuum Pump
- 5.2.6.4.6 Dual Seal Temperature Oven Statham Model TC-2

5.2.7 Zero and Sensitivity Shift with Temperature

Test by. Dept 8772

Test started! 5 Dec 63

Test completed 5 Dec 63

5.2.7.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraphs 3.3.9, 3.3.10 and 3.3.11 Zero Shift. Less than $0.02\%~FS/^0F$ Sersitivity shift. Less than $0.02\%~FS/^0F$

5.2.7.2 Test Method

The transducer was placed in a temperature test chamber pre-adjusted to maintain a constant temperature of $+30^{\circ}F$. The transducer pressure port was connected to a dead weight pressure system capable of producing pressure variation from 0 psig to 2500 psig. The pressure system also incorporated a vacuum pump and a vacuum gage. A potential of 28 v dc was applied and a calibration performed consisting of 11 pressure points taken in 500 psig increments from 0 psig increasing to 2500 psig and decreasing to 0 psig. This procedure was repeated at temperatures of 30.75, and 150°F. A simulated pressure

5.2.7.2 Test Method (cont)

calibration was performed when the transducer was stabilized at 75°F.

5.2.7.3 Test Results

The transducers complied with all test requirements of Paragraph 5.2.7.1. Output values during the temperature tests are shown in Figures 5 through 9.

5.2.7.4 Test Equipment

- 5.2.7.4.1 Amthor Dead Weight Tester Model 460
- 5.2.7.4.2 Power Supply, Kay Labs., Absolute dc, PN 110-542-200-1
- 5.2.7.4.3 Alinco Type C Calibrator, PN 0-220907
- 5.2.7.4.4 Micron Gauge, CVC, Model 321-T
- 5.2.7.4.5 Temperature Test Chamber, Statham Model TC-2
- 5.2.7.4.6 Vacuum Pump, Welch

.5.3 Vibration

5.3.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraphs 3.4.2(e), 4.7.1.1

Excitation: 28 v d-c

Vibration: Sinusoidal and random per Figures 2 and 3 of Aerojet-General Specification 32060.

Performance Verification: Per Paragraph 5.2.6 of this document.

5.3.2 Test Method

This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060, Paragraph 4.4.3.

5.4 Acceleration

5.4.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.4.2(a) and 4.7.1.2

Acceleration, ½ 15 g three mutually perpendicular axes

Duration: 3 minutes each direction

Excitation 28 + 0.01 v d-c

Performance Verification: Per Paragraph 5.2.6 of this document

5.4.2 Test Method

This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060, Paragraph 4.4.3.

5.5 Temperature Altitude

5.5.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3 4 1(e) and 4.7,1.3.

5,5 1 1 Ambient Pressure: 6.8 psia (20 000 ft)

Temperature: $-45^{\circ}F$ to \div $160^{\circ}F$

Duration: 4 minutes

Performance Verification. Strip Chart recording during test, and per Paragraph 5.2.6 of this document following exposure.

5.5.2 Test Method

This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060. Paragraph 4.4.3.

5.6 Altitude

5.6.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.4.2(d) and 4.7.1.3.1.

Excitation: 28 v d-c

Ambient Pressure: 240 microns-Hg (200,000 ft)

Performance: Per Paragraph 5.2.6 of this Report

5.6.2 Test Method

This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060, Paragraph 4.4.3.

5.7 Humidity

5.7.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.4.1(a) and 4.7.1.4

Excitation: 28 v d-c

Relative Humidity: 95%

Temperature: 110°F and 120°F

Duration: 100 cycles at 2 hr/cycle

5.7.2 Test Method

This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060, Paragraph 4.4.3.

5.8 Hermetic Seal

5.8.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 4.7.1.6

5.8 Hermetic Seal

5.8.2 Test Method

This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060, Paragraph 4.4.3.

5.9 Radio Frequency Interference

5.9.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.3.3.2 and 4.7.1.11

5.9.2 Test Method

This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060, Paragraph 4.4.3.

5,10 Repeat Performance

Following completion of all environmental tests, the transducer shall demonstrate continued satisfactory performance in accordance with the tests specified in Paragraph 5.2 of this document. This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060; Paragraph 4.4.3.

5.11 Frequency Response

Test by M. A. Henry

Test started. 5 Nov 1962

Test completed: 12 Dec 1963

5.11,1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.3.7.2

A, mendix A

5.11 Frequency Response

Specimen No's, 3 and 5

Excitation: 28 v d-c

Response Time: Less than 1 millisec from 10 to 90% full scale when stimulated with a full-scale pressure step function.

5.11.2 Test Method

The transducer was installed in the expansion section of a shock tube. The driver section of the shock tube was pressurized and the diaphragm separating the driving and expansion sections was ruptured. The response of the transducer to the shock pressure was generated when the diaphragm rupture was recorded on an oscilloscope and photographed. The frequency response testing was conducted using the shock tube at the Aerojet Azusa facility. Pressure shock amplitudes varying from 400 to 1000 psig were applied.

5.11.3 Test Results

The transducers complied with all test requirements of Paragraph 5.11.5. Data and test results are shown in Figures 10 through 15.

Three test specimens were tested at the Azusa shock tube test facility. Two of the test specimens met the rise time requirements (Reference Aerojet Specification 32060, Paragraph 5.11.5); however, both units failed the performance calibration test performed after the shock tube tests. The third unit failed to meet the rise time requirement.

5.11 Frequency Response

Inspection of the test specimens showed that the outer diaphragm (approximately 0.002 in. thick) which transmits the damping fluid to the inner (serior) diaphragm (approximately 0.025 in. thick). The resultant damage was deformation and rupture of the outer diaphragm. This caused the loss of the damping fluid which also acts as the coupling between the diaphragms. Therefore, the performance of the transducer was severely degraded. It was found that the pressure step caused a mechanical shock of 1000 g's. A redesign of the pressure transmitting system within the transducer was required so that testing could be completed on schedule. The redesign eliminated the outer diaphragm, the orifice, and the damping fluid. The new design uses only the pressure sensing diaphragm.

Two test specimens of the new design were again tested. The transducers complied with all test requirements of paragraph 5.11.5. Test results indicate that the dynamic characteristics of the transducer are repeatable at the various pressure levels verifying the linearity of the transducer dynamic characteristics.

5.11.4 Test Equipment

- 5,11,4,1 Shock Tube
- 5.11.4.2 Oscilloscope

5.12 Motor and Igniter Test Firings

5.12.1 Test Requirements

Aerojet-General Corporation Specification 32060, Paragraph 3.0,

5.12 Motor Static Test Firings

Specimen No.'s: 1, 2, and 3

The object of the tests are to prove the capability of the test specimens to meet all performance characteristics under actual operating conditions. Performance verification per Paragraph 5.2.6 was conducted after each test.

5.12.2 Test Method

- 5.12.2.1 The test specimen's were installed on five secondstage Minutemar motors to monitor igniter pressures
 during static test firings. Identical hardware and
 installation methods were used to mount the test
 specimen as those used on flight-test motors. For
 comparative purposes, a pressure transducer used to
 monitor chamber pressure was used as a reference with
 the test specimen. Pressure transducer output from
 both the test specimen and the reference was monitored
 and recorded during the motor firings on an
 oscillograph.
- 5.12.2.2 The test specimens were subjected to five igniter firings for each of two tests. The igniters were fired in a special igniter test fixture. For comparative purposes, a reference pressure transducer was connected to the igniter pressure chamber monitoring igniter pressure simultaneously with the test specimens, pressure transducer output from both the test specimen and the reference was monitored and recorded during the igniter firings on an oscillograph.

5.12 Motor Static Test Firings

5.12.3 Test Results

The transducers complied with all test requirements of Paragraph 5.12.1. Pre- and posttest calibration of the transducers and data from the motor firings are shown in Figures 16 through 37. Results from the igniter firings are shown in Figures 38 through 62.

5.13 Reliability

5.13.1 Performance Reliability

5.13.1.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 4.7.1.13.1.

Excitation: 28 v d-c

Temperature: $75 \pm 10^{\circ}$ F

Duration: 30 minutes

Pressure: Room ambient

Temperature-time Profile: (Established from the tests of

Paragraph 5.5 of this Report).

Vibration: Sinusoidal and rardom as per Figures 2 and 3 of

Aerojet Specification 32060.

Performance Tests. Per Paragraph 5.2.6 of this Report.

5.13.1.2 Test Method

5.13.1.2.1 This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060.

Paragraph 4.4.3.

5 13.2 Safety Reliability

Test by: Dept. 3830

Test started: 6 Feb 63

Test completed: 17 April 63

5.13.2.1 Test Requirement

Aerojet-General Corporation Specification 32060A, Paragraph 3.5.1.

Safety Reliability 1558 minimum applications of 5000 psig to two transducer pressure housings.

5.13.2.2 Test Method

A pressure cycling device was fabricated which enabled repeated application of 5000 psig to two pressure transducers. The transducers were manifolded to the pressure cycler and 5000 psig pressure applications were applied for a minimum of 1558 consecutive times. Following the pressure cycling, the transducers were examined for evidence of physical deformation and leakage.

5,13,2,3 Test Results

The transducers complied with all test requirements of Paragraph 5.14.1. Test methods and results are shown as follows.

The Safety Reliability Test was started 2 February 1963,
The test setup was as shown in Figures 63 and 64. Test
specimens were pulsed 1 pressure application of 5000 psi
and pressure released. Visual inspection revealed no visible
leaks. Testing continued for 44 pressure cycles. (1 sec
pressure, 1 sec no pressure) using an electrical sequencer

5.13.2 Safety Reliability

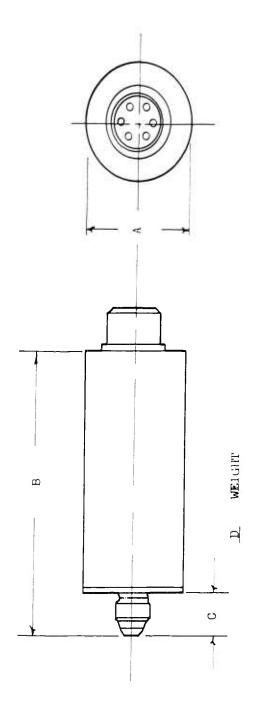
for cycle control. After 45 pressure cycles a leak was detected in both test specimens.

A failure diagnosis study showed the six 6-32 by 0.375-in.-long cap screws used to secure the pressure cap to the transducer housing were of too low a tensile strength and stretched which allowed the pressure cap to unseat from the transducer housing thereby causing pressure release. The cap screws were replaced with 6-32 by 0.375-in.-long alloy steel cap screws which have a higher tensile strength than those originally used and testing was continued.

The two test specimens were subjected to an additional 778 pressure cycles of 5000 psig after the cap screw replacement. A visual posttest observation of the specimens revealed no learage of hydraulic oil; no longitudinal or radial deformation of the cases was evident. Pre- and posttest micrometer measurements of case diameter were identical. High tensile strength screws will be used in all transducers of this model delivered to Aerojet.

5.13.2.4 Test Equipment

- 7.17 Pressure Cycler equipment including:
- a. Hydraulic supply, (5000 psig) Nankervis model 9440B
- b. Pressure valve, Futurematic Solenoid, 3-way, 0 to 6000 psi, A/N 20896
- c. Pressure system monitor, Taber Pressure Transducer, range 0 to 10K with C.E.C. recording oscillograph, Type 5-119.



Transducer Dimension Diagram

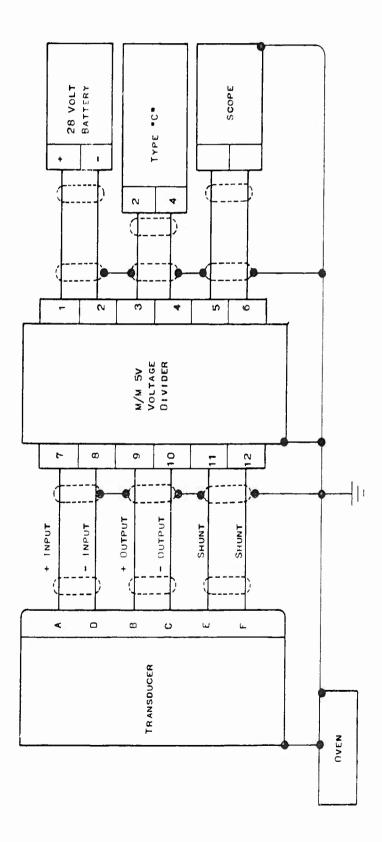
SN 491 SN 487	Specimen Specimen No. 4 No. 5	1.375 1.375	3.750 3.741	. 551	
SN 703	Specimen No. 3	1.375	3.749	. 552	3.5
SN 493	Specimen No. 2	1.375	3.750	. 552	91
SN 477	Specimen No. 1	1.375	3.750	. 550	σ
	Requirements	1.75 in max	5.00 in. max	0.55 in. max	13 oz. max
	Dimensional Code*	V	В	ى ت	1

* See Figure 1

Dimensional Inspection Results

			7	[
NN -187	Specimen No. 5	10K Megs		SN 487	Specimen No. 5	10K Megs
161: NS	Specimen No. 4	10K Megs		N 491	Specimen No. 4	TOK Megs
SN 703	Specimen No. 3	10K Megs		SO7 NS	Specimen No. 3	10K Megs
SN 493	Specimen No. 2	TOK Megs		8.61. NS	Specimen No. 2	10K Mers
SN 477	Specimen No. 1	TOK Megs		771. NS	Specimen No. 1	10K Megs
	Tolerance In Megohms	l Megohm Minimum			Tolerance In Megohms	1 Meghom Winimum
I. Insulation Resistance	Insulation Resistance Between	Pins A, B, C, D, E, and F To Case		II. Excitation Circuit Isolation	Circuit Isolation Between Pins	A, B To C, D

Insulation Resistance and Excitation Circuit Isolation



Calibration Wiring Diagram

Figure 4

PAN	YGE: 2500	PSIA ONLY OUTPUT)	MINTENA PRESSIR	ERAL CORPORATION OCKET PLANT N OPERATIONAL E TRANSDUCER	Pol	Page 1 of 5
PO	Statham		serial no	L ⁷⁷ T Dept. 8772	RANGE_	1-2570 beia
DDEL	PA33hTC		CALIBRATED B	Dept. 8772	DATE _	12-11-62
OOM TEM	4P76	*7	ass ioned	to zignz no.	pal Test	
AROMETR	RIC PRESSUR	E	7.4 MM HO	PARAME	TER MEASTR	ED
				CHECKED BI	Ken Bus	hey
no v rema		g) 		ASSIGNED BI_	P. E. Le	8772 ed s
no v rema	IAL INSPECT VISIBLE DAM LRKS ACCEPT I. CASE IN	g) ION AGE DUE TO S		ASSIGNED BI_	P. E. Le	eds ATION
NO V REMA	UAL INSPECT VISIBLE DAM URKS ACCEPT I. CASE IN BETWEEN	g) ION AGE DUE TO S		ASSIGNED BY_ III. CIT BETT	ENTER LEGISTER SERVICE LEGISTER LEGISTE	ATION TANCE TOLERANCE
NO V REMA	UAL INSPECT VISIBLE DAM URKS ACCEPT I. CASE IN BETWEEN	g) ION AGE DUE TO S. ISULATION RESISTANCE		ASSIGNED BY_ III. CIT BETT	P. E. Le	ATION TANCE TOLERANCE
NO V REMA	IAL INSPECT VISIBLE DAM RKS ACCEPT I. CASE IN BETWEEN CASE & PINS	g) ION AGE DUE TO S ISULATION RESISTANCE IN HEGOHMS		ASSIGNED BI_ IG, PACKAGING, ETC III. CIP BETFE PINS A-D & E	EN E. LA EN RESIST IN MES B-C 10K	ATION TANCE TOLERANCE
NO V REMA	IAL INSPECT VISIBLE DAM LRKS ACCEPT I. CASE IN BETWEEN CASE & PINS A	g) ION AGE DUE TO S ISULATION RESISTANCE IN MEGOHES 10K Meg		ASSIGNED BY_ III. CIT BETT	EN E. LA EN RESIST IN MES B-C 10K	ATION TANCE TOLERANCE
NO V REMA	IAL INSPECT VISIBLE DAM RKS ACCEPT I. CASE IN BETWEEN CASE & PINS A B	g) ION AGE DUE TO S. ISULATION RESISTANCE IN MEGOHNS 10K Meg 10K Meg	TOLERANCE 1 Megohm	ASSIGNED BI_ IG, PACKAGING, ETC III. CIP BETFE PINS A-D & E	EN E. LA EN RESIST IN MES B-C 10K	ATION TANCE TOLERANCE
NO V REMA	IAL INSPECT VISIBLE DAM RKS ACCEPT CASE IN BETWEEN CASE & PINS A B C	SULATION RESISTANCE IN MEGOHNS 10K Meg 10K Meg 10K Meg	TOLERANCE 1 Megohm	ASSIGNED BI_ IG, PACKAGING, ETC III. CIP BETFE PINS A-D & E	EN E. LA EN RESIST IN MES B-C 10K	ATION TANCE TOLERANCE

IV. PRIMARI POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
41	70 MA Max.	28	28±0.2VIC

X ACCEPT

Page 2 of 5

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT) AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 12-12-62 S/N 477

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

BEFORE O	RENCE ONLY VERPRESSURE EADINGS	0VERPRES 3750 210		FOR REFER AFTER OVE PSIO RE	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLIS	PULL SCALE OUT PUT IN VOLTS
35.9	5.037	6.736	7.50V MAXIMUM	և9.6	5.056

X ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
15 mv	25 MV MAXIMUM

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT

MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

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VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 2 5°F (HOTES 1 2 2)

PRESSURE	OUTPUT IN UNITS		LINEARITY	HYSTERESIS	REPRAT -	EXCITATION	VOLTAGE ON				
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	TOLIFANCE	VOLTAGE	TOLERANCE				
. 0	2222	m	x								
500	2001	2006	1940 2060								
1000	4005	3975	3940 4060	40 Unit		287					
1500	6003	5975	5940	Variation							
2000	8276	7990	7940 3060								
2500	10,000	19999	I			<u> </u>					
0	วาวา	วาาา	ı	Maximum Deviation From Average of Three Cycles	Maximum						
500	2003	2008	1940 2060			06.11	28 ± 0.2				
1000	4775	397º	7840 7090		1						
1500	6201	59º3	5940 6060		267	ØDC .					
2000	8005	7992	7940 8060								
2500	12000	19990	I		20 Units	0 Units					
0	2222	2222	I								
500	52017	2709	1940 2060								
1000	4208	3 973	3 <i>9</i> 40 4060	40 Unit		287					
1500	5775	59 ⁸ 0	5940 6060	Variation				4		۷,1	
2000	8228	7958	7940 8060								
2500	10000	10000	I								
A	. LINE'ARITY		B. HYS	eleent i	(. REPEATABI	ILITY				
	X ACCRET		X A	CCEPT		X ACCEPT					

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75 ± 5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7510	7,475 7,525	297	28 28 28 28 28 28 28 28 28 28 28 28 28 2

ACCEPT

ST 3083A DATE: 9-17-62

RANGE: 2500 PSIA ONLY (5V OUTPUT)

AEROJET-CENERAL CORPORATION

SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL

PRESSURE TRANSDUCER

Page 4 of 5

12-12-62 DATE

477 S/N_

IX. LINEARITY, HYSTERESIS. • 30 2 5°F (NOTES 1 & 2)

PRESSURE (PSIO)	OUTPUT DECREASING	IN UNITS INCREASING	LINEARITI TOLERANCE	HISTERES IS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE	
0	+1		ı		25.7		
500	2000	1975	1940 2060				
1000	F30F	3972	39ko	40 Unit		55.7	28 20.2
1500	-6000	5772	1,060 5940 6060	Variation		ADC	
2000	5203	7986	7940				
2500	10,000	17000	I				

ACCEPT

I. LINEARITY, HYSTERESIS, 0 150 1 5°F (NOTES 1 & 2)

PRESSURE	OUTPUT IN UNITS		LINEARITY	HYSTERES IS	EXCITATION	EXCITATION	
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	VOLTAGE	VOLTAGE TOLERANCE	
0	-1		r				
500	1993	1973	1940 2060				
1000	399 ⁸	3970	3 <i>9</i> 40 4060	40 Unit	287	227	28 ± 0.2
1500	5998	£973	5940	Variation	٤.١	ADC	
2000	8000	7985	7 <i>9</i> 40 8060				
2500	10,000	566 <u>8</u>	I				

ACCEPT

SERVICE VALUE 1. 4 CT

TT CONU	OULLOL (HOL	100 H & 21					
FUNCTION	00TP0T @ 7525°F	EXCUTATION VOLTAGE	OUTPUT @ 3025°F	EXCITATION VOLTAGE	0th Put 0 150±5 T	VOLTAGE	EXCITATION TOLERANCE
ZERO OUT PUT IN MILLIVOLT	21.2	28V	+25.8	287	-30.8	28V	
ZERO OUT PUT TOLERANCE	- b +102mv	I	A±55 mv	I	A±85 mv	X	28 ± 0.2 VDC

MEROJET-GEMERAL CORPORATION SOLID ROCKET PLANT

Page 5 of 5 12-12-62

DATE: 9-17-62 RANGE: 2500 PSIA ONLY

(5V OUTPUT)

ST 3083A

MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATR 12-12-52

S/N_____

XII. FULL	SCALE OUTP	ot (note 6)					7.00
FUNCT ION	001 P01 0 75-5°F	excitation voltage	00TPUT • 30±5°F	EXCITATION VOLTAGE	OUTPUT 015025°F	FICITATION VOLTAGE	VOLTAGE TOLERANCE
r.s.ovr- pvr (psio) in volis	5.053	287	5.047	28 V	5.031	287	
ZERO OUT - PUT (FSIA) IN VOLTS	.ગા.જા	257	.051.2	287	.0040	28₹	28 - 0.2
CORRECTED F.S.OUTPUT IN VOLTS	∆ 5.9039	287	4.993	257	5.027	28₹	VDC
P.S.OUTPUT COLUMN A TOL.	5 ± 0.1 ¥	x	A ± .0557	I	# ± .0857	I	

X ACCEPT

GENERAL NOTES:

- a. All readings shall be taken at 75 15°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 10.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. I = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- f. These calibration data sheets shall be used with the latest revision of Asrojet Calibration Procedure ACP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 peig pressure and range type *C* calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to zero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer sero output (test XI) shall be recorded at 5.0 mm Hg or less.
- 5. Negative voltage reading shall not be accepted at 75 ± 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (57 OUTPUT) FUNCTIONAL CALIBRATION KEROJET - GENERAL CORPORATION Page 1 of 5 SOLID ROCKST PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER P.O.# MFG. Statham RANOE 1-2500 bsia SERIAL NO. 493 PA33UTC 12-11-62 CALIBRATED BY Dept. 8772 MODEL DATE 76 ROOM TEMP. _ 757.4 MM HO PARAMETER MEASURED TERRITORIESSELTEX BAROMETRIC PRESSURE Yen Bushey CHECKED BY Dept. 8772 P. E. Leeds χ ACCEPTED ASSIGNED BY (NOTE g) I. VISUAL INSPECTION NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC. ACCEPT II. CASE INSULATION III. CIPCUIT ISOLATION BETWEEN RESISTANCE CASE & PINS IN MECOHMS BETHEEN RESISTANCE TOLERANCE TOLERANCE PINS IN MEDGORAS l Megohm Minimum 10% Veg 10K Meg A-D & B-C 10% Yes В ACCEPT 10K Meg 1 Megohm Ċ Minimum 10% Yeg 10K Meg 10% Meg ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
41	70 MA Max	25	28±0.2VDC

X ACCEPT

AEROJET-GENERAL CORPORATION

Page 2 of 5

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)

SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

12-12-62 DATE_ 493 3/N__

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

BEFORE O	RENCE ONLY VERPRESSURE EADINGS	0VERPRES 3750 ±10			ENCE ONLY RPRESSURE ADINGS
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUT PUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLIS	PULL SCALE OUTPUT IN VOLITS
62.5	5.038	6.759	7.50V MAXIMUM	72.Ц	5.052

ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
13 m v	25 MV MAXIMUM

ACCEPT

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY

(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER Page 3 of 5

DATE 12-12-62

S/N 193

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 2 5°F (NOTES 1 & 2)

PRESS URE	OUTPUT IN UNITS		LINEARITY	HYSTERESIS	REPEAT-	EXCITATION	EXCITATION VOLTAGE		
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	TOLERANCE	VOLTAGE	TOLERANCE		
0	2220	วาาว	x	40 Unit					
500	2014	2118	1940 2060						
1000	4023	4030	3940 4060			287			
1500	6038	6047	5940 6060	Variation					
2000	8038	8051	7940 8060						
2500	10,000	10000	I						
0	าาาา	2000	I						
500	2018	2020	1940 2060	Maximum Deviation From Variation Average of Three Cycles	,	Maximum	Maximum		
1000	և037	4036	3940 4060		Deviation	287	28 ± 0.2		
1500	6044	6050	5940 6060			∇DC			
2000	8041	8757	7940 8060		Cycles 20 Units				
2500	10000	10000	X						
0	วาวา	2222	I						
500	2017	2020	1940 2060						
1000	4032	นา36	3940 4060	40 Unit Variation					
1500	6041	8406	5940 6060			28₹			
2000	8745	8050	7940 8060						
2500	10000	10000	I						
A	. LINEARITY		B. HYS	TERES IS	C	. REPEATABI	LITY		
Γ	X ACCEPT		X A	CCEPT		X ACCEPT			

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7506	7,475 7,525	28₹	28±0.2 VDC

ST 3083A

DATE: 9-17-62
RANGE: 2500 PSIA OHLT
(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT

MINUTEMAN OPERATIONAL

PRESSURE TRANSDUCER

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12-12-62

493 S/N

DATE

IX. LINEARITY, HYSTERESIS, 0 30 2 5°F (NOTES 1 & 2)

PRESSURE	OUTPUT :	IN UNITS	LINEARITY	HISTERESIS	RECORD EXCITATION	EXCITATION VOLTAGE
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	~~voltage"	TOLERANCE
0	-16		ı			
500	1998	1992	1940 2060			
1000	1057	4015	3940 4060	ho Unit	28 v	28 10.2
1500	6038	6031	5940 6060	Variation		VDC .
2000	8737	8030	7940 8060			
2500	10,000	9995	I			

ACCEPT

LINEARITY, HYSTERESIS. @ 150 1 5°F (NOTES 1 & 2)

PRESSURE	OUTPUT	OUTPUT IN UNITS		HYSTERESIS	RECORD EXCITATION	EXCITATION
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	VOLTAGE	VOLTAGE TOLERANCE
0	-3		x			
500	2004	2000	1940 2060			
1000	4020	4011	3940 4060	40 Unit	287	28 ± 0.2
1500	6031	6022	5940 6060	Variation	201	ADC
2000	8035	8030	7 <i>9</i> 40 8060			
2500	10,000	9997	I			

ACCEPT

II. ZERO OUTPUT (NOTES h & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT 9 3025°F	excitation voltage	0 150±5°F		RICITATION VOLTAGE TOLERANCE
ZERO OUT PUT IN MILLIVOLT	▲ 43.3	28 V	+53.2	28⊽	+2.17	28₹	
ZERO OUTPUT TOLERANCE	-0 +102mv	x	A±55 HV	I	A±85 mv	X	28 ± 0.2 VDC

X ACCEPT

MEROJET-GENERAL CORPORATION

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ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLI
(5V OUTPUT)

SOLID ROCKET PLANT MINUTENAN OPERATIONAL PRESSURE TRANSDUCER

DATR 12-12-52

XII. FULL	SCALE OUTP	ut (note 6)					
FUNCT ION	007 PUT @ 75-5°F	EXCITATION VOLTAGE	OUTPUT © 30±5°F	EXCITATION VOLTAGE	OUTPUT @15025*F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
PUT (PSIG) IN VOLTS	₹.∩ 5 2	5 ₆ A	5.068	SBA	5.011	58.4	
ZKRO OUT - PUT (PSIA)	. 2698	5e.1	. 1 ⁸ 50	2°V	.0529	287	28 ± 0.2
CORRECTED F.S.OUTPUT IN VOLTS	A 4.9822	2°7	942	287	4.958	2°7	₹DC
F.S.OUTPUT COLUMN A TOL	5 ± 0,1 ¥	x	A ² .055₹	I	± ± .085₹	ı	

X ACCEPT

GENERAL NOTES:

- a. All readings shall be taken at 75 15°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. X = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- These calibration data sheets shall be used with the latest revision of Asrojet Galibration Procedure ACF A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type 8C8 calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to sero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer sero output (test II) shall be recorded at 5.0 mm Hg or less.
- 5. Negative voltage reading shall not be accepted at 75 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 peig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 peig and record the difference in column A as full scale output at each temperature point.

ST 3083 DATE: RANGE:	2500 P	SIA ONLY UTPUT)	minutema	TERAL CORPORATION COCKET PLANT N OPERATIONAL E TRANSDUCER		FIONAL CALIBRATI Page 1 of 5
Ծ. St				703		
DEL PA3	3liTC		CALIERATED B	TDept. 8772	DATE _	12-5-62
OM TEMP	7 <u>[</u>	•F	ass ioned	TO ENGINE NO	Qual Test	,
				PARAME		
				CHECKED BY	Ken B	ush ey
	ACCEPTE	ന		CHECKED BY_ ASSIGNED BY_	Dept.	8772
	(NOTE g	. /				-
NO VISIBI	LE DAMAG		HIPPING, HANDLI	NG, PACKAGING, ETC	·	
NO VISIBI REMARKS	LE DAMAG	ON BE DUE TO S		III. CI	RCUIT ISOL	111107
NO VISIBI REMARKS X AC II. C	CEPT CASE INS	ON BE DUE TO SI BULATION LES ISTANCE IN MEGOHMS	HIPPING, HANDLII	III. CI BETWE PINS	RCUIT ISOL EN RESIST IN ME	TANCE TOLERANG
NO VISIBI REMARKS X AC II. C BET CASE	CEPT CASE INS	ON BE DUE TO SI BULATION BESISTANCE		III. CI BETWE PINS	RCUIT ISOL	TANCE TOLERANG
NO VISIBI REMARKS X AC II. C BET CASE	CCEPT CASE INS	ON BE DUE TO SI BULATION LES ISTANCE IN MEGOHMS		III. CI BETWE PINS A-D &	RCUIT ISOLUTEN RESISTIN MEDITAL BEC 10,00	TANCE TOLERANG
NO VISIBI REMARKS X AC II. C BET CASE	CCEPT CASE INS WEEN R	ON BE DUE TO SE BULATION BESISTANCE IN MEGOHMS 10,000M	TOLERANCE 1 Megohm	III. CI BETWE PINS A-D &	RCUIT ISOL EN RESIST IN ME	TANCE TOLERANG
NO VISIBI REMARKS X AC II. C BET CASE	CCEPT CASE INS WEEN R & PINS I	ON BE DUE TO SI BULATION DESISTANCE IN MEGOHES 10,000M	TOLERANCE	III. CI BETWE PINS A-D &	RCUIT ISOLUTEN RESISTIN MEDITAL BEC 10,00	TANCE TOLERANG
II. C	CCEPT CASE INS WEEN R & PINS I A B	ON BE DUE TO SI BULATION DESISTANCE IN MEGOHES 10,000M 10,000M	TOLERANCE 1 Megohm	III. CI BETWE PINS A-D &	RCUIT ISOLUTEN RESISTIN MEDITAL BEC 10,00	TANCE TOLERANG

IV. PRIMARY POWER CURRENT

i	READING IN		EXCITATION	
	MILLIAMPS	TOLERANCE	VOLTAGE	TOLERANCE
	42	70 MA Max.	28	28±0.2VDC

X ACCEPT

Page 2 of 5

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 12-5-62
S/N 773

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

BEFORE O	FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIO READINGS		OVERPRESSURE 3750 10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUT PUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUT PUT IN VOLTS	
77.5	5 . 0Ś2	6.5º1	7.50V MAXIMUM	6°.և	5. Դեև	

X ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
10	25 MV MAXIMUM

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY

(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

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VII. LINEARITY, HYSTERESIS, REPRATABILITY @ 75 2 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUT PUT DECREASING	IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERES IS TOLERANCE	REPEAT- ABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	+1		x				
500	1998	1998	1940 2060]			
1000	4010	4009	3940 4060	40 Unit		28V	
1500	6016	6017	5940 5960	Variation		i i	
2000	8019	8 0 20	7940 8060				
2500	10,000	9998	x				
0	-1		I				
500	1998	1998	19կ0 2060		Maximum		28 ± 0.2
1000	կ010	7008	3940 4060	lio mate	Unit From Variation Average of Three	28¥	
1500	6015	6016	5940 6060				
2000	8018	8020	7940 8060		Cycles		
2500	9998	9998	I		20 Units		
0	-1		I				
500	1998	1998	1940 2060				
1000	4009	4007	3940 4060	40 Unit		28⊽	
1500	6015	6016	5940 6060	Variation			
2000	8019	8018	7940 8060				
2500	9998	9995	x				
<u>,</u>	LINEARITY X ACCEPT			TERES IS CCEPT		X ACCEPT	LITY

WITT SUINT CATTERATION (NOTE 2)

١	ATTT. DUONI	CALIDRATION	(MOLE)/		
	% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
	75	7512	7,475	28₹	28±0.2

ACCEPT

ST 3083A

DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION

SOLID ROCKET PLANT MINUTEMAN OPERATIONAL

PRESSURE TRANSDUCER

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12-5-62

713 S/N

DATE

IX. LINEARITY, HYSTERESIS, @ 30 1 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT I	N UNITS INCREASING	LINEARITI TOLERANCE	HISTERES IS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	-6		I			
500	1994	1992	1940 2060]		
1000	41705	7228	3940 4060	hO Unit	28 v	28 10.2
1500	6112	6017	5940 6060	Variation		VDC .
2000	8012	£018	7940 8060]		
2500	10,000	12006	I			

ACCEPT

I. LINEARITY, HYSTERESIS, @ 150 1 5°F (NOTES 1 & 2)

PRESSURE	OUTPUT	IN UNITS	LINEARITY	HYSTERESIS	RECORD EXCITATION	EXCITATION
(PSIG)	DECREASING INCREAS		TOLERANCE	TOLERANCE	VOLTAGE	VOLTAGE TOLERANCE
0	0		x			28 ± 0.2
500	1993	1990	19կ0 2060			
1000	4001	3999	3940 4060	40 Unit	28₹	
1500	600 7	6207	6090 2310	Variation		
2000	×017	² 018	7940 8060			
2500	10,000	9998	I			

ACCEPT

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	00TPUT @ 3025°F	EXCITATION VOLTAGE	our pur e 150±5°r		EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A +39.7	28 V	+33.0	28V	+30.3	287	
ZERO OUT PUT TOLERANCE	-0 +102mv	x	A255 W	x	A±85 mv	x	28 ± 0.2 VDC

AEROJET-GENERAL CORPORATION

Page 5 of 5

ST 3083A DATE: 9-17-62 SOLID ROCKET PLANT MINUTENAN OPERATIONAL

12-5-62

RANGE: 2500 PSIA ONLI (5V OUTPUT) PRESSURE TRANSDUCER

s/N______773

FUNOTION	SCALE OUTP OUTPUT @ 75-5°F	OT (NOTE 6) EXCITATION VOLTAGE	OUTPUT e 3025°F	EXCITATION VOLTAGE	OUTPUT @15025°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S.OUT- PUT (PSIG) IN VOLTS	5.046	28₹	5. วน3	287	5.0170	28 . 1	
ZERO OVITA IN VOLTS	.0690	28V	.1601	247	.061 ^p	28 7	28 ± 0.2
CORRECTED F.S.OUTPUT IN VOLTS	∆ 4.977	28♥	4.983	5 _{6.1} 1	lı.9552	28V	∀DC
P.S.OUTPUT COLUMN A TOL.	5 ± 0.1 ¥	x	A ± .055V	I.	# ± .085₹	I	

X ACCEPT

GENERAL NOTES:

- a. All readings shall be taken at 75 15°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. I = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- f. These calibration data absets shall be used with the latest revision of Asrojet Galibration Procedure ACP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type $^{*}C^{*}$ calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to zero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer sero output (test II) shall be recorded at 5.0 mm Hg or less.
- 5. Negative voltage reading shall not be accepted at 75 ± 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 peig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 peig and record the difference in column A as full scale output at each temperature point.

ST 3083A DATE: 9-17-62		Kerojet -gener 80LID ROC	RAL CORPORATION		ONAL CALLEPATION Page 1 of 5
RANGE: 2500 PS (5V OU	SIA ONLY JIPUT)	SOLID ROO MINUTEMAN PRESSURE	OPERATIONAL TRANSDUCER	P.O.#_	
FG. Statham	· <u>.</u>	SERIAL NO.	l:91	RANGE	7-2500 psia
ODEL PA334TC		CALIBRATED BY_	Dept. 8772	DATE _	12-5-62
OOM TEMP.		ASS IONED T	O ENGINE NO	Qual Te	st
AROMETRIC PRESSURE					
			CHECKED BY	Ken Busi	hey
X ACCEPTE (NOTE R	ID		ASSIGNED BY_	R. E. Le	. 8772 eds
NO VISIBLE DAMAG	E DUE TO SH	IPPING, HANDLING	, PACKAGING, ETC		
X ACCEPT		IPPING, HANDLING			ARTON
X ACCEPT II. CASE INS BETWEEN R	ULATION ESISTANCE		III. CI BETWE	RCUIT ISOL	TANCE TOLERANC
X ACCEPT II. CASE INS BETWEEN R CASE & PINS I	ULATION ESISTANCE N MEGOHMS	IPPING, HANDLING	III. CI BETWE PINS	RCUIT ISOL	TANCE TOLERANC
X ACCEPT II. CASE INS BETWEEN R CASE & PINS I	ULATION ESISTANCE N MEGOHMS 10,000M		III. CI BETWE PINS	RCUIT ISOL	TANCE TOLERANC
X ACCEPT II. CASE INS BETWEEN R CASE & PINS I A B	ULATION ESISTANCE N MEGOHMS 10,000M		III. CI BETWE PINS A-D &	RCUIT ISOL	TANCE TOLERANC
X ACCEPT II. CASE INS BETWEEN R CASE & PINS I A B C	ULATION ESISTANCE N MEGOHMS 10,000M	TOLERANCE	III. CI BETWE PINS A-D &	RCUIT ISOL EN RESIS IN ME B-C 10,0	TANCE TOLERANC
X ACCEPT II. CASE INS BETWEEN R CASE & PINS I A B C	ULATION ESISTANCE N MEGOHMS 10,000M 10,000M	TOLERANCE	III. CI BETWE PINS A-D &	RCUIT ISOL EN RESIS IN ME B-C 10,0	TANCE TOLERANC

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
կ2	70 MA Max.	28₹	28±0,2VDC

X ACCEPT

Functional Calibration, Transducer SN 491

Figure 8

Page 2 of 5

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 12-5-62
S/N 491

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

BEFORE O	FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PS IO READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUT PUT IN TOLERANCE VOLTS		ZERO OUTPUT FULL SCAI IN MILLIVOLTS VOITS		
95.4	5.107			77.0	5.100	

X ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
12	25 MV MAXIMUM

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62 491 3/<u>N</u>

Page 3 of 5

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 2 5°F (NOTES 1 & 2)

PRESSURE		IN UNITS	LINEARITY	HYSTERESIS	REPEAT -	EXCITATION	VOLTAGE VOLTAGE	
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	TOLERANCE	VOLTAGE	TOLERANCE	
0	+2		x				İ	
500	1998	1980	1940 2060]				
1000	3799	3977	39կ0 և 06 0	40 Unit		28⊽		
1500	5996	5982	5940 6060	Variat'.on				
2000	4205	7996	791.0 8060					
2500	10,000	9997	x					
0	-1		x					
500	1995	19 ⁸ 1	19կ0 2060	Maximum Deviation	:			
1000	3977	3975	3940 4060			28 V	28 ± 0.2 VDC	
1500	5995	5980	5940 6060	Variation	Average of Three			
2000	F 772	7995	7940 8060		Cycles			
2500	9997	9998	X		20 Units			
0	-2		I					
500	1994	1977	1940 2060					
1000	39 7 5	3973	3940 4060	40 Unit		28♥		
1500	5993	5978	5940 6060	Variation				
2000	8002	7991	79 40 8060					
2500	9998	9996	I					
A	. LINEARITY		B. HY	STERES IS	(REPEATAB	ILITY	
ſ	X ACCEPT		X	ACCEPT		X ACCEPT		

VIII. SHUNT CALIBRATION (NOTE 3)

1111	Ontage Diet 1011	(11012)/		
% OF FULL SCALE	75 ± 5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7505	7,475 7,525	28₹	28±0.2

X ACCEPT

ST 3083A

DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION

SOLID ROCKET PLANT

MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

Page 4 of 5

12-5-62

491 S/N

DATE

LINEARITY, HYSTERESIS, @ 30 2 5°F (NOTES 1 & 2)

PRESSURE	OUTPUT	OUTPUT IN UNITS		HYSTERESIS	RECORD	EXCITATION VOLTAGE TOLERANCE	
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	RECORD EXCITATION VOLTAGE	TOLERANCE	
0	-12		I			28 ±0.2 VDC	
500	1987	1968	1940 2060				
1000	3997	3976	3940 4060	40 Unit	28₹		
1500	6003	5988	5940 6060	Variation			
2000	8008	8200	7940 6060				
2500	10,000	9997	I				

ACCEPT

I. LINEARITY, HYSTERESIS, @ 150 1 5°F (NOTES 1 & 2)

PRESSURE	OUTPUT	IN UNITS	LINEARITY	HYSTERES IS	RECORD EXCITATION	EXCITATION VOLTAGE
(PSIG)	DECREASING INCREASING		ASING TOLERANCE TOLERANCE		VOLTAGE	VOLTAGE TOLERANCE
0	0		I			
500	1992	1975	1940 2060			
1000	3995	3971	3940 4060	40 Unit	28 V	28 ± 0.2
1500	5992	5970	5940 5940	Variation		
2000	8000	7982	7 <i>9</i> 40 8060			
2500	10,000	9994	x			

ACCEPT

ALO ZISKU	OULLOL (NOT	ES 4 6 5/					
FUNCTION	output @ 7525°F	EXCITATION VOLTAGE	OUTPUT @ 3025°F	EXCITATION VOLTAGE	ourfur o 150±5°F	VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUT PUT IN MILLIVOLT	<u>♣</u> + <u>47.4</u>	28 V	+68.7	28 V	+63.5	28 V	
ZERO OUT PUT TOLERANCE	-0 +102mv	x	A#55 mv	I	A±85 mv	x	28 ± 0.2 VDC

ACCEPT

MEROJET-GENERAL CORPORATION SOLID ROCKET PLANT

Page 5 of 5

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLI

MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER DATR 12-5-62 S/N 491

(s/r					
FUNCTION	OUT PUT	excitation voltage	OUTPUT • 3025°F	EXCITATION VOLTAGE	OUT PUT @15025°F	excitation voltage	VOLTAGE TOLERANCE			
P.S.OUT- PUT (PSIG) IN VOLTS	5.102	28 V	5.087	28V	5.1150	28 V				
ZEBO OUT TO THE TOTAL TO THE TOTAL T	.0773	287	.0521	28V	.1020	28 V	28 ± 0.2			
CORRECTED F.S.OUTPUT IN VOLTS	↓ 5.025	28 V	5.035	28 V	5.0130	28♥	∀ DC			
P.S.OUTPUT COLUMN A	5 ± 0.1 V	x	A ± .055V	I	A : .085V	I				

X ACCEPT

GENERAL NOTES:

- a. All readings shall be taken at 75 1 5°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 10.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. I = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- f. These calibration data sheets shall be used with the latest revision of Asrojet Calibration Procedure ACP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type 12 Cm calibrator for 10,000 units on first cycle only.
- 2. Linearity telerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to zero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer sero output (test II) shall be recorded at 5.0 mm Hg or less.
- 5. Negative voltage reading shall not be accepted at 75 ± 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

RANGE: 2500 (51	PSIA ONLY OUTPUT)	minuteman Pressure	eral corporation DOKET PLANT OPERATIONAL E TRANSDUCER	P.O.#	
FO. Statha	m	SERIAL NO	l:87 Dept. 8772	RANOB_	0-2500 nsia
DDEL PA334	rc	CALIBRATED BY	Dept. 8772	DATE	12-5-62
			TO ENGINE NO		
			PARAME		
			CHECKED BY_	Ken Bush	ney
X ACCE	PTED Eg)		ASSIGNED BY_	Dept. 8 R. E. Lee	772 eds
. VISUAL INSPEC	MAGE DUE TO SI	HIPPING, HANDLIN	G, PACKAGING, ETC		
NO VISIBLE DA REMARKS X ACCEPT II. CASE BETWEEN	MAGE DUE TO SI		III. CI	RCUIT ISOLAT	NCE TOLERANCE
VISUAL INSPEC NO VISIBLE DA REMARKS X ACCEPT II. CASE BETWEEN CASE & PI	MAGE DUE TO SI INSULATION RESISTANCE IS IN MEGOHMS	HIPPING, HANDLIN	III. CI BETWE PINS	RCUIT ISOLAT	NCE TOLERANCE
VISUAL INSPEC NO VISIBLE DA REMARKS X ACCEPT II. CASE BETWEEN CASE & PI A	INSULATION RESISTANCE IS IN MEGOHMS 10,000 M		III. CI BETWE PINS	RCUIT ISOLAT	NCE TOLERANCE
VISUAL INSPEC NO VISIBLE DA REMARKS X ACCEPT II. CASE BETWEEN CASE & PI	INSULATION RESISTANCE IS IN MEGOHMS 10,000 M 10,000M	TOLERANCE	III. CI BETWE PINS A-D &	RCUIT ISOLAT	NCE TOLERANCE
VISUAL INSPEC NO VISIBLE DA REMARKS X ACCEPT II. CASE BETWEEN CASE & PII A	INSULATION RESISTANCE 10,000 M 10,000M		III. CI BETWE PINS A-D &	RCUIT ISOLAT EN RESISTAT IN MEGOI B-C 10,000	NCE TOLERANCE
VISUAL INSPEC NO VISIBLE DA REMARKS X ACCEPT II. CASE BETWEEN CASE & PI A B C	INSULATION RESISTANCE IS IN MEGOHMS 10,000 M 10,000M 10,000M	TOLERANCE 1 Megohm	III. CI BETWE PINS A-D &	RCUIT ISOLAT EN RESISTAT IN MEGOI B-C 10,000	NCE TOLERANCE
VISUAL INSPEC NO VISIBLE DA REMARKS X ACCEPT II. CASE BETWEEN CASE & PI A B C	INSULATION RESISTANCE 10,000 M 10,000M	TOLERANCE 1 Megohm	III. CI BETWE PINS A-D &	RCUIT ISOLAT EN RESISTAT IN MEGOI B-C 10,000	NCE TOLERANCE

IV. PRIMARY POWER CURRENT

READING MILLIAM	 TOLER	ANCE	EXCITATION VOLTAGE	TOLERANCE
42	70 MA	Max	28	28±0.2VDC

X ACCEPT

Page 2 of 5

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 12-5-62
S/N 487

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

BEFORE O	FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIO READINGS		OVERPRESSURE 3750 10 FSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PS IO READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUT PUT IN TOLERANCE :		ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLITS	
123.0	5.106	6.736	7.50V MAXIMUM	124.1	5.111	

X ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
15	25 MV MAXIMUM

ST 3083A

DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

Page 3 of 5

12-5-62 DATE 487 S/N

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 * 5°F (NOTES 1 & 2)

PRESSURE		IN UNITS	LINEARITY	HYSTERESIS	REPEAT -	EXCITATION	EXCITATION VOLTAGE
(PSIO)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	TOLERANCE	VOLTAGE	TOLERANCE
0	+3		x				
500	2008	1994	1940 2060				
1000	4018	4002	3940 4060	40 Unit		28⊽	
1500	6019	6007	5940 6060	Variation			
2000	8011	8004	7940 8060			İ	
2500	10,000	9998	x				
0	+4		I				
500	2010	1996	1940 2060		Maximum	28₹	28 ± 0.2 VDC
1000	4018	4003	3940 4060	40 Unit	Deviation From		
1500	6017	6008	5940 6060	Variation	Average of Three		
2000	8010	8005	7940 8060		Cycles		
2500	9998	9998	x		20 Units		
0	+5		I				
500	2009	1995	1940 2060				
1000	4018	4003	3940 4060	40 Unit	}	ļ	
1500	6016	6008	5940 6060	Variation		28 ₹	
2000	8010	8003	7940 8060				
2500	9998	9995	x				

X ACCEPT

X ACCEPT

X ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7513	7,475 7,525	28₹	28±0.2 VDC

ACCEPT X

ST 3083A

DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

ABROJET-GENERAL CORPORATION SOLID ROCKET PLANT

MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

Page 4 of 5

12-5-62

487 S/N

DATE

IX. LINEARITY, HYSTERESIS. @ 30 \$ 5°F (NOTES 1 & 2)

PRESSURE (PSIO)	OUTPUT DECREASING	IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERES IS TOLERANCE	RECORD EXCITATION VOLTAGE	VOLTAGE TOLERANCE
0	-1		I			
500	2003	1988	1940 2060]		
1000	4015	3997	3940 4060	hO Unit	28 V	28 ±0.2
1500	6015	6^03	5940 6060	Variation	2 n v	VDC
2000	8011	8008	7940 8060			
2500	10,000	10008	x			

ACCEPT

I. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE	OUTPUT	IN UNITS	LINEARITY	HYSTERES IS	RECORD EXCITATION	EXCITATION
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	VOLTAGE	VOLTAGE TOLERANCE
0	2		x			
500	1999	1984	1940 2060			
1000	4011	3992	3940 4060	40 Unit	28♥	28 ± 0.2
1500	6015	6000	5940 6060	Variation	20 V	ADC
2000	8015	8002	7940 8060			
2500	10,000	9970	I			

ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 3025°F	EXCITATION VOLTAGE	0tr Ptr 0 150±5°F		EXCITATION VOLTAGE TOLERANCE
ZERO OUT PUT IN MILLIVOLT	A +97.0	28V	+93.9	28 V	+86.1	287	
ZERO OUT PUT TOLERANCE	-b +102mv	ı	A.155 mv	I	A±85 mv	x	28 ± 0.2 VDC

MEROJET-GENERAL CORPORATION SOLID ROCKET PLANT Page 5 of 5

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY

(5V OUTPUT)

SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 12-5-62

III. FULL	SCALE OUTP	ut (note 6)					111122 TV 41
FUNCTION	ourpur e 75-5°F	excitation voltage	001101 0 3025°7	EXCITATION VOLTAGE	OUTPUT @15025°F	EXCITATION VOLTAGE	VOLTAGE TOLERANCE
F.S.QUT- PUT (PSIG) IN VOLTS	5.109	28 V	5.128	28⊽	5.0760	28₹	
ZERO (OUT A)	.1269	28 V	.1218	28 V	.1160	28⊽	28 ± 0.2
CORRECTED F.S.OUTPUT IN VOLTS	▲ 4.982	28₹	5.006	28⊽	4.9600	28▼	VDC
P.S.OUTPUT COLUMN A TOL.	5 ± 0.1 ¥	x	A ± .055V	r	A ± .085V	r	

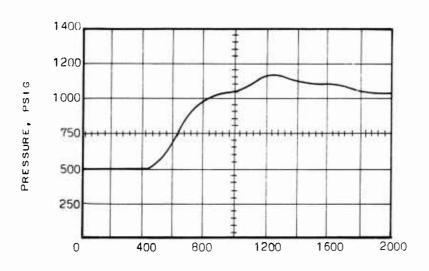
X ACCEPT

GENERAL NOTES:

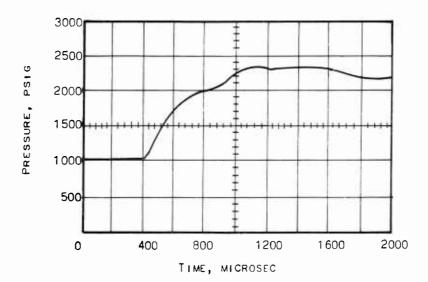
- a. All readings shall be taken at 75 1 5°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. I = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- These calibration data sheets shall be used with the latest revision of Asrojet Galibration Procedure ACP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 peig pressure and range type "C" calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to sero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.
- 5. Hegative voltage reading shall not be accepted at 75 ± 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

TRANSDUCER 3N 703



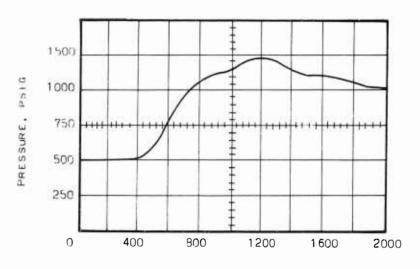
TIME, MICROSEC



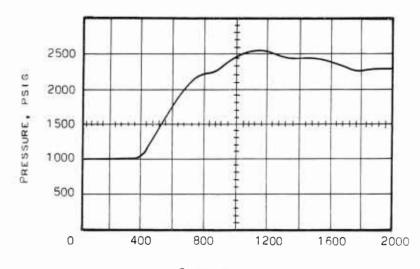
Pressure Shock Traces, Transducer SN 703

Figure 10

TRANSDUCER SN 487



TIME, MICROSEC



TIME, MICROSEC

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)	AEROJET -GENER SOLID ROU MINUTEMAN (PRESSURE !	AL CORPORATION NET PLANT OPERATIONAL TRANSDUCER		Dage	CALIBRATION 1 of 5
MPG. Statham	SERIAL NO	487	RANGE	2.5M	
MODELPA33LTC					<u> </u>
ROOM TEMP. 74	ASSIGNED TO	ENGINE NO	Qual Test		
BAROMETRIC PRESSURE 759.3	мм но	PARAM	eter measure	ID	
X ACCEPTED (NOTE g)		CHECKED BY_	Ken B Dept. R. E. Leed	ushey 8772 s	
REMARKS X ACCEPT II. CASE INSULATION BETWEEN RESISTANCE TO THE	OLERANCE	BETWI	RCUIT ISOLAT	ANCE TO	DLERANCE
CASE & PINS IN MEGOHMS T			B-C 10,00	1	Megohm
В 10,000М		n-2 d	5-0	1 1/1	Inimum
	1 Megohm	X AC	CCEPT		
n 10,000M	Minimum				
E 10,000M					
F 10,000M					
X ACCEPT					

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
142	70 MA Max.	28	28±0.2VDC

X ACCEPT

Calibration Prior to Pressure Shock Test, Transducer SN 487

Page 2 of 5

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY

(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 12-5-62
S/N 487

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

BEFORE O	FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		RE 3750 10 PS IA		ENCE ONLY RPRESSURE ADINGS
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN TOLERANCE VOLTS		ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLITS
123.0	5.106	6.736	7.50V MAXIMUM	124.1	5.111

X ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (FEAK TO FEAK) READING @ F.S.	TOLERANCE
15	25 MV MAXIMUM

X ACCEPT

Calibration Prior to Pressure Shock Test, Transducer SN 487 ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT) AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER Page 3 of 5

DATE 12-5-62

S/N 487

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 * 5°F (NOTES 1 & 2)

PRESS URB		IN UNITS	LINEARITY	HYSTERESIS	REPEAT -	EXCITATION	EXCITATION OF
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	TOLERANCE	VOLTAGE	TOLERANCI
0	+3	+3	x				
500	2008	1994	1940 2060			İ	
1000	P018	<u> </u> կոо 2	3940 4060	40 Unit		287	
1500	6019	6007	5940 6060	Variation		201	
2000	8011	8004	7940 8060				
2500	10,000	9998	I				
0	+ft	+11	I				1
500	2010	1996	1 <i>9</i> 40 2060		Maximum		
1000	4018	4003	3940 4060	40 Unit	Deviation From	- 0	28 ± 0.2 VDC
1500	6017	6008	5940 6060	Variation	Average of Three	28 V	
2000	8010	8005	7940 8060		Cycles		
2500	9998	9998	I		20 Units		
0	+5	+5	r				
500	2009	1995	1940 2060				
1000	4018	4003	3940 4060	40 Unit			
1500	6016	6008	5940 6060	Variation		28⊽	
2000	8010	8003	7940 8060				
2500	9998	9998	x			Ì	

A. LINEARITY

B. HYSTERES:

X ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

	V.122241112011	(2012))		
% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7513	7,475 7,525	28⊽	28±0.2 VDC

X ACCEPT

Calibration Prior to Pressure Shock Test, Transducer SN 487 ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT) AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER Page 4 of 5 12-5-62

DATE

S/N

IX. LINEARITY, HYSTERESIS, @ 30 2 5°F (NOTES 1 & 2)

PRESSURE			HYSTERESIS	RECORD BXCITATION	EXCITATION VOLTAGE	
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	EXCITATION VOLTAGE	TOLFRANCE
0	-1	-1	I			
500	2003	1988	1940 2060] [
1000	4015	3997	3940 4060	40 Unit	28V	28 ±0.2
1500	6015	6003	5940 6060	Variation		VDC .
2000	8011	8008	7940			
2500	10,000	10008	I			

X ACCEPT

I. LINEARITY, HYSTERESIS, @ 150 2 5°F (NOTES 1 & 2)

PRESSURE	OUTPUT	IN UNITS	LINEARITY HYSTERESI		RECORD EXCITATION	EXCITATION
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	VOLTAGE	VOLTAGE TOLERANCE
0	0	0	x			
500	1999	198և	1940 2060			
1000	4011	3992	3940 4060	40 Unit	28▼	28 ± 0.2
1500	6015	6000	5940 6 0 60	Variation	201	ADC
2000	8015	8002	7940 8060			
2500	10,000	9970	I			

X ACCEPT

II. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 7525°F	EXCITATION VOLTAGE	00TPUT @ 3025°F	EXCITATION VOLTAGE	0tr pur 0 15025°F	FAXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUT PUT IN MILLIVOLT	A 97.0	28₹	93.9	28⊽	86.1	28₹	
ZERO OUT PUT TOLERANCE	-0 +102mv	I	A.155 BV	I	A±85 mv	x	28 ± 0.2 VDC

X ACCEPT

Calibration Prior to Pressure Shock Test, Transducer SN 487

MEROJET-GENERAL CORPORATION

SOLID ROCKET PLANT

Page 5 of 5

DATE: 9-17-62 RANGE: 2500 PSIA ONLI

(5V OUTPUT)

ST 3083A

MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

S/N 487

III. FULL	SCALE OUTP	OT (NOTE 6)					100
FUNOT ION	001P01 0 75-5°F	excitation voltage	OUTPUT • 3025°F	EXCITATION VOLTAGE	OUTPUT @15025°F	RICITATION VOLTAGE	VOLTAGE TOLERANCE
P.S.OUT- PUT (PSIG) IN VOLIS	5.109	28V	5.128	28V	5.076	28 V	
ZKBO OUT - PUT (PSIA)	.126	28 V	.121	28 V	.116	28₹	28 ± 0.2
CORRECTED F.S.OUTPUT IN VOLTS	↓ 4.982	28 V	5.006	28 V	4.960-	28₹	₹ DC
P.S.OUTPUT COLUMN A TOL.	5 ± 0.1 V	I	A ± .055V	I	A ± .085V	I	

E ACCEPT

GENERAL NOTES:

- a. All readings shall be taken at 75 15°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. I = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- These calibration data sheets shall be used with the latest revision of Asrojet Galibration Procedure ACP A-2h16.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to zero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.
- 5. Hegative voltage reading shall not be accepted at 75 * 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 peig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 peig and record the difference in column A as full scale output at each temperature point.

AKROJET-GENERAL CORPORATION SOLID ROCKET PLANT

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MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 487 S/X

	(5V OUTPUT) SCALE OUTP	or (note 6)		s/x			
FUNCT TONUT	007 PUT 0 75-5°F	excitation voltage	007707 • 3025°7	EXCITATION VOLTAGE	007 PUT @15025°F	EXCITATION VOLTAGE	VOLTAGE TOLERANCE
P.S.OUT- PUT (PSIG) IN VOLTS	5.109	28 v	5.128	28V	5.076	287	
ZEBO OUT TO THE TOTAL TO THE TOTAL T	.126	28 v	.121	26 A	.116	28▼	28 ± 0.2
CORRECTED F.S.OUTPUT IN VOLTS	▲ 4.982	28⊽	5.006	28 7	4.960-	28₹	∀DC
P.S.OUTPUT COLUMN A	5 ± 0.1 ¥	x	A ± .055V	I	4 ± . 085₹	ı	

E ACCEPT

ST 3083A

DATE: 9-17-62 RANGE: 2500 PSIA ONLI

GENERAL NOTES:

- a. All readings shall be taken at 75 15°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. X = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- f. These calibration data sheets shall be used with the latest revision of Asrojet Calibration Procedure ACP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to zero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer sero output (test II) shall be recorded at 5.0 mm Hg or less.
- 5. Negative voltage reading shall not be accepted at 75 ± 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)	Kerojet -gene 80LID Ro Minuteman Pressure			JEE CALIBRATION Page 1 of 5
Statham			RANGE	0-2500 psia
PA33LTC	CALIBRATED BY	Dept. 8772	DATE	1-22-63
OOM TEMP	ass ioned	TO ENGINE NO		
AROMETRIC PRESSURE	757.8 MM HO	PARAMET	ER MEASURED) 1.11
		CHECKED BY	Ken Bushe	у
X ACCEPTED		ASSIGNED BY	Dept. 8	772 ds
VISUAL INSPECTION NO VISIBLE DAMAGE DUE TO S. REMARKS		G, PACKAGING, ETC.		
NO VISIBLE DAMAGE DUE TO S. REMARKS ACCEPT				
NO VISIBLE DAMAGE DUE TO S REMARKS X ACCEPT II. CASE INSULATION BETWEEN RESISTANCE		III. CIR	CUIT ISOLAT	NCE TOTERANCE
NO VISIBLE DAMAGE DUE TO S REMARKS X ACCEPT II. CASE INSULATION BETWEEN RESISTANCE CASE & PINS IN MEGORMS		III. CIR BETWEE PINS	CUIT ISOLAT N RESISTA IN MEGO	NCE TOLERANCE
NO VISIBLE DAMAGE DUE TO S REMARKS X ACCEPT II. CASE INSULATION BETWEEN RESISTANCE		III. CIR BETWEE PINS A-D & B	CUIT ISOLAT N RESISTAI IN MEGO	NCE TOLERANCE
NO VISIBLE DAMAGE DUE TO S REMARKS X ACCEPT II. CASE INSULATION BETWEEN RESISTANCE CASE & PINS IN MEGORMS A 10,000M	TOLERANCE	III. CIR BETWEE PINS	CUIT ISOLAT N RESISTAI IN MEGO	NCE TOLERANCE
NO VISIBLE DAMAGE DUE TO S. REMARKS X ACCEPT II. CASE INSULATION BETWEEN RESISTANCE CASE & PINS IN MEGORIMS A 10,000M B 10,000M	TOLERANCE	III. CIR BETWEE PINS A-D & B	CUIT ISOLAT N RESISTAI IN MEGO	NCE TOLERANCE
NO VISIBLE DAMAGE DUE TO S REMARKS X ACCEPT II. CASE INSULATION BETWEEN RESISTANCE CASE & PINS IN MEGORIS A 10,000M B 10,000M C 10,000M	TOLERANCE	III. CIR BETWEE PINS A-D & B	CUIT ISOLAT N RESISTAI IN MEGO	NCE TOLERANCE

IV.	PRIMARY	POWER	CURRENT

*** **********	10021 00120	A11		
READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE	
42	70 MA Max.	28	28±0,2VDC	

X ACCEPT

Calibration After Pressure Shock Test, Transducer SN 487

Page 2 of 5

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINISTERAN OPERATIONAL

MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 1-22-63
S/N 487

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

BEFORE O	RENCE ONLY VERPRESSURE CADINGS	0VERPRE 3750 ‡10		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIO READINGS	
ZERO OUTPUT IN MILLIVOLTS	ZERO OUTPUT FULL SCALE		FULL SCALE OUT PUT IN TOLERANCE VOLTS		FULL SCALE OUTPUT IN VOLTS
142.5	5.137	6 , 850	7.50V MAXIMUM	143.1	5.139

X ACCEPT

ST 3083A

DATE: 9-17-62

RANGE: 2500 PSIA ONLY

(5V OUTPUT)

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
20mv	25 MV MAXIMUM

X ACCEPT

Calibration After Pressure Shock Test, Transducer SN 487

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER Page 3 of 5
1-22-63
S/N 4497

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 2 5°F (NOTES 1 4 2)

PRESSURE (PSIO)	OUT PUT DECREASING	IN UNITS	LINEARITY TOLERANCE	HYSTERES IS TOLERANCE	REPEAT- ABILITY TOLFRANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	+3		x			28 V	
500	2009	1293	1940 2060		Maximum Deviation From Average of Three Cycles 20 Units		
1000	4016	1,707	3940 4060	40 Unit			
1500	6015	£20L	5940 6060	Variation			
2000	#119	£103	7940 3060				
2500	10,000	9996	x				
0	+4		X	40 Unit Variation		2ª V	28 ± 0.2 VDC
500	2010	1007	1940 2060				
1000	4017	1.001	3940 4060				
1500	6115	5775	5940 6060				
2000	8 20 B	[£] 203	7940 8060				
2500	9996	9996	X				
0	+6		I			28 V	
500	2010	1993	1940 2060				
1000	401°	4771	3940 4060	μΟ Unit Variation			
1500	6015	6006	5940 6060				
2000	8008	⁹ 203	7 <i>9</i> 40 8060				
2500	9996	9995	r				

A. LINEARITY
X ACCEPT

X ACCEPT

C. REPEATABILIT

VIII. SHUNT CALIBRATION (NOTE 3)

		1		
% OF FULL SCALE	75 ± 5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7406	7,475 7,525	28	28±0.2 VDC

X ACCEPT

Calibration After Pressure Shock Test, Transducer SN 487 ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA OHLY (5V OUTPUT) AEROJET-OEMERAL CORPORATION SOLID ROCKET PLANT MINUTENAN OPERATIONAL PRESSURE TRANSDUCER

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DATE 1-22-63

S/N

X. LINEARITY, HISTERESIS, • 30 2 5°F (NOTES 1 & 2)

PRESSURE	OUTPUT IN UNITS		LINEARITY	HISTERESIS	RECORD PTC 700 A 70 T COM	VOLTAGE ON
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	RECORD EXCITATION VOLTAGE	TOLERANCE
0	+2		I			28 ±0.2 VDC
500	2001	1990	1940 2060			
1000	4011	3996	3940 4060	40 Unit	28¥	
1500	6999	5995	5940 6060	Variation		
2000	8207	7996	7940 2000			
2500	10,000	9995	I			

X ACCEPT

I. LINEARITY, HYSTERESIS, @ 150 2 5°F (MOTES 1 & 2)

PRESSURE	OUTPUT IN UNITS DECREASING INCREASING		LINEARITY	HYSTERES IS	RECORD EXCITATION VOLTAGE	LOTESTHOR AOTIVOR EXCILATION
(PSIG)			TOLERANCE	TOLERANCE		
0	0		I			28 ± 0.2 VDC
500	2001	1984	1 <i>9</i> 40 2060		28⊽	
1000	7015	3994	3940 4060	40 Unit		
1500	6015	6001	5940 6060	Variation		
2000	8015	8006	7940 8060			
2500	10,000	9984	I			

X ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	007P07 @ 75±5°F	EXCITATION VOLTAGE	0UTPUT 9 3025°F	EXCITATION VOLTAGE	0tm PUT € 150±5°T	FRICITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUT PUT IN MILLIVOLT	100.5	28 V	108.1	28₹	106.9	28₹	
ZERO OUT PUT TOLERANCE	-b +102mv	I	A255 W	I	A±85 NY	X	28 ± 0.2 VDC

X ACCEPT

Report 0162-01DR-26

ARROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTENAN OPERATIONAL

Page 5 of 5

1.27

1-22-63

DATE: 9-17-62 RANGE: 2500 PSIA ONLI (5V OUTPUT)

PRESSURE TRANSDUCER

II.	PULL	SCALE	OUTPUT	(HOTE	<u>5)</u>

FUNCTION	007 P07 @ 75-5°F	EXCITATION VOLTAGE	OUTFUT • 30 ² 5°F	EXCITATION VOLTAGE	OUT PUT 015025°F	VOLTAGE VOLTAGE	EXCITATION VOLTAGE TOLERANCE
P.S.OUT- PUT (PSIG) IN VOLTS	5.137	28	5.157	28	5.114	28	
ZEBO OUT G	.1427	28	.1373	2°	.1382	28	28 ± 0.2
CORRECTED F.S.OUTPUT IN VOLTS	А 4.9943	28	5.0197	2°	4.9758	28	ADC
P.S.OUTPUT COLUMN A TOL.	5 ± 0.1 ₹	x	A ± .0557	I	¥ ± .085₹	I	

X ACCEPT

ST 3083A

GENERAL NOTES:

- a. All readings shall be taken at 75 15°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. X = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- f. These calibration data sheets shall be used with the latest revision of Asrojet Calibration Procedure ACP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 paig pressure and range type "C" calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to zero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer zero output (test II) shall be recorded at 5.0 mm Hg or less.
- 5. Negative voltage reading shall not be accepted at 75 ± 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 paig and record the difference in column A as full scale output at each temperature point.

Calibration After Pressure Shock Test. Transducer SN 487

Report 0162-01DR-26

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ((5V OUTPU	AEROJEI 801 DNLY MINU 1) PRE	-general cori JD rocket flj Iteman operati Bsure transdu	FORATION INT CONAL ICER		Pa	BE ge 1 of 5	
MFG. Statham	SERIAL N	703		RANGE_	0-250	Σ psia	
MODELPA33LTC	CALIBRAT	ED BY Dep	t. 8772	DATE _	12-9	;_62	
ROOM TEMP. 74				Qual Test			
BAROMETRIC PRESSURE				TER MBASUR	130	7 E =	18
ACCEPTED (NOTE g)		CHE AS SI	GNED BY	Ken Eush Dept. R. E. Lee	.ey 8772 eds		
I. VISUAL INSPECTION NO VISIBLE DAMAGE DU REMARKS	E TO SHIPPING, HA	NDLING, PACKA	SING, ETC.				
II. CASE INSULAT	ION	- -		cuit isor			,
BETWEEN RESIS CASE & PINS IN ME	TANCE TOLERANCE			N RESIST		TOLERANCE	
A 10,	nnom.		A-D & B	_c 10,00	XXX	l Megohm Minimum	
в 10,6	200M						
c 10,	1 Megohm	1	X ACC	epr			
n 10,0	Minimum MCOOM						
B 10,0	мосс						
F 10,0	M000M						
X ACCEPT							

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
Ъ2	70 MA Max.	28	28±0,2VDC

X ACCEPT

Calibration Prior to Pressure Shock Test, Transducer SN 703

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 12-5-62 S/N 703

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

BEFORE O	FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		SSURE) PSIA	FOR REFERENCE ONLY AFTER OVERPRESSURE PSIO READINGS		
ZERO OUT PUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUT PUT IN TOLERANCE VOLTS		ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUT PUT IN VOLITS	
77.5	5.052	6.581	7.50V MAXIMUM	68 . 4	5. շևև	

X ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PRAK TO PEAK) READING @ F.S.	TOLERANCE
10	25 MV MAXIMUM

X ACCEPT

Calibration Prior to Pressure Shock Test, Transducer SN 703

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

Page 3 of 5 12-5-62 DATE

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VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 2 5°F (NOTES 1 4 2)

PRESS URB		IN UNITS	LINEARITY	HYSTERESIS	REPEAT -	EXCITATION	EXCITATION
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	TOLERANCE	VOLTAGE	TOLERANCE
0	+1		х				
500	1998	199 ⁸	1940 2060			25 V	
1000	l 010	FJJJ	7080 7080	40 Unit			
1500	6016	6017	5940	Variation			
2000	8019	8020	7940 8060				
2500	10,000	99 9 8	I				
0	-1		x				
500	1998	1998	1940 2060				
1000	կ010	4208	3940 4060	40 Unit			28 ± 0.2
1500	6015	6016	5940 6060	Variation		267	∀DC
2000	8018	8020	7940 8060				
2500	9998	9998	X				
0	-1		x				
500	1998	1996	1940 2060				
1000	4709	4007	3940 4060	40 Unit		287	
1500	6015	6016	5940 6060	Variation		201	
2000	8019	8018	7940 8060				
2500	9998	9995	x				
A	. LINEARITY		в. нто	treis	C	. REPEATABI	LITY
	X ACCEPT		X A	CCEPT		X ACCEPT	

VIII. SHUNT CALIBRATION (NOTE 3)

١	TIT. DUONI	CALIBRATION	(3012-3)		
	% OF FULL SCALE	75 ± 5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
	75	7512	7,475	28	28 ± 0.2

ACCEPT X

Calibration Prior to Pressure Shock Test, Transducer SN 703

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY

(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

Page 4 of 5 12-5-62

DATE 703 3/N

LINEARTTY, HYSTERESIS, a 30 \$ 5°F (HOTES 1 & 2)

PRESSURE	OUTPUT IN UNITS		LINEARITI	HYSTERESIS	RECORD	EXCITATION OF	
(PSIG)	DECREASING	IMCREASING	TOLERANCE	TOLERANCE	EXCITATION VOLTAGE	TOLFRANCE	
0	-6		x			28 10.2 VDC	
500	199կ	1992	1940 2060				
1000	4225	P008	3940 4060	40 Unit	28A		
1500	6012	601 7	5940 6060	Variation			
2000	8012	8018	7940 2020				
2500	10,000	10006	I				

ACCEPT

LINEARITY, HYSTERESIS, @ 150 + 5°F (MOTES 1 & 2)

PRESSURE	OUTPUT IN UNITS		LINEARITY	HISTERES IS	BECORD EXCITATION	RICITATION	
(ESIG)	DECREASING			TOLERANCE	VOLTAGE	VOLTAGE TOLERANCE	
0	0		I			28 ± 0.2	
500	1993	1990	1940 2060				
1000	նဘ1	3999	3940 4060	40 Unit	287		
1500	6997	6207	5940 6060	Variation			
2000	8014	⁸ 013	7940 8060				
2500	10,000	9998	I				

ACCEPT

ZERO OUT PUT (NOTES 1 4 5)

AL ANNU	OULFUL (NOT	80 4 8 5)					_
FUNCTION	00TPUT @ 7525°F	EXCITATION VOLTAGE	OUTPUT 0 3025°F	EXCITATION VOLTAGE	0th Put 0 150±5°F	VOLTAGE	TOLERANCE
ZERO OUT PUT IN MILLIVOLT	A +39.7	28V	+33.0	28V	+30.3	257	
ZERO OUT PUT TOLERANCE	-0 +102mv	I	A.255 RV	I	A±85 mv	X	28 ± 0.2 VDC

X ACCEPT

Calibration Prior to Pressure Shock Test, Transducer SN 703

KEROJET-GENERAL CORPORATION SOLID ROCKET PLANT

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ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)

HIMUTEMAN OPERATIONAL PRESSURE TRANSDUCER

12-5-52 703

8/M

III. PULL	SCALE OUTP	ut (note 6)					nana and an annual
FUNCTION	001P01 0 75 ² 5°F	excitation voltage	001701 0 3025°7	EXCITATION VOLTAGE	OUT PUT @15025*F	VOLTAGE VOLTAGE	VOLTAGE TOLERANCE
P.S.OUT- PUT (PSIG) IN VOLTS	5.046	287	5.043	287	5.0170	287	
ZEBO OUT - DY VOLES	.1691	287	.7699	287	.%18	25V	28 2 0.2
CORRECTED F.S.OUTPUT IN VOLTS	▲ 4.977	28V	L.983	28 V	4.9552	58A	∀ DC
COLUMN A	5 ± 0.1 ¥	I	A ± .0557	I	£ 2.0857	x	

ACCEPT

GENERAL NOTES:

- a. All readings shall be taken at 75 15°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. I = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- f. These calibration data sheets shall be used with the latest revision of Asrojet Calibration Procedure ACP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST KOTES:

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 peig pressure and range type 8 C 8 calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to sero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer sero output (test XI) shall be recorded at 5.0 mm Hg or less.
- 5. Hegative voltage reading shall not be accepted at 75 5 T.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Report 0162-01DR-26

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)	Merojet -gener 5011D roc Hinuteman Pressure	RAL CORPORATION DEST PLANT OPERATIONAL TRANSDUCER	P.O.#	ST-SHOCK	TUBE TEST
MFG. Statham	_ SERIAL NO	703	RANGE	0-2500	osia
MODEL PA33LTC-2.5M	_ CALIERATED BY	Dept. 8772	DATE _	1-9-63	
ROOM TEMP	assioned t	o engine no	ևև FW-113		
BAROMETRIC PRESSURE 766					
X ACCEPTED (NOTE g)		CHECKED BY	P. E. Le	bury 8772 eeds	
NO VISIBLE DAMAGE DUE TO SHE REMARKS X ACCEPT	irrino, nanullino	, PACKAGING, ET			
II. CASE INSULATION			POUT ISOL		
BETWEEN RESISTANCE CASE & PINS IN MEGOHNS	TOLERANCE	BETW	RESIST IN MEX	30 71MS	TOLERANCE
A 400M		1	B-C 20,		l Megohm Minimum
B 20,000M		<u> </u>			
c 20,000M	1 Magoha	X A	CCEPT		
BOOM at	Minimum				
B 600M					
700M					
X ACCEPT					

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
38MA	70 MA Max.	28⊽	28±0,2VDC

X ACCEPT

Calibration After Pressure Shock Test, Transducer SN 703

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 1-9-63
S/N 703

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 10 PS IA			FOR REFERENCE ONLY AFTER OVERPRESSURE PSIO READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTFUT IN VOLTS	FULL SCALE OUTPUT IN TOLERANCE VOLTS		ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUT PUT IN VOLTS	
67.1 mv	5.046	6.659	7.50V MAXIMUM	57.8	5.038	

X ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
lh mv	25 MV MAXIMUM

X ACCEPT

Calibration After Pressure Shock Test, Transducer SN 703 ST 3083A

DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

Page 3 of 5 1-9-63 DATE 703 3/<u>H</u>

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 2 5°F (MOTES 1 4 2)

PRESSURE	OUTPUT	IN UNITS	LINEARITY	HYSTERESIS	REPRAT-	EXCITATION	ZCITATIO		
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	TOLIZANCE	VOLTAGE	TOLERANCE		
. 0	0	າ	x						
500	1994.8	1992.2	1940 2060	40 Unit					
1000	4203.6	4200.6	3940 4060			28VDC			
1500	6013.5	6010.8	5940 6060	Variation		25705			
2000	8019.5	8012.5	7940 3060]					
2500	10,000	9997.9	x						
0	2	0	I				28 ± 0.2		
500	1995.4	1991.6	1940 2060		Maximum				
1000	µ2.У2. Ц	3999.8	3940 4060	lo These	Deviation Deviation Prom 28.				
1500	6712.8	6010.0	5940	Variation		287			
2000	8013.7	8012.3	6060 7940 8060		Cycles	1			
2500	9997.9	9996.0	I		20 Units				
0	0	0	I						
500	1995.4	1991.6	1940 2060						
1000	8.5004	3999.2	3940 4060	LO Unit		28₹			
1500	6012.1	6709.2	5940 6060	Variation		201			
2000	8013.3	8011.0	7940 8060						
2500	9996.0	9990.0	I						
A	. LINEARITY		B. HY	etres is	(. REPEATAB	ILITY		

X ACCEPT

ACCEPT

I ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

1	T T T P	DUOUT	OVERTING TOU	(1012)/		
	% FULL	OF SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
		75	7503 .7	7,475 7,525	28₹	28±0.2

ACCEPT

Calibration After Pressure Shock Test. Transducer SN 703

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTENAN OPERATIONAL PRESSURE TRANSDUCER

Page 4 of 5

DATE 1-9-63

S/N 703

X. LINEARITY, HISTERESIS, 0 30 2 5°F (HOTES 1 4 2)

PRESSURE (PSIO)	OUT PUT DECREASING	IN UNITS INCREASING	LINEARITI TOLERANCE	HISTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION TOLERANCE
0	-11	-11	ı			
500	1981.9	1996.7	1940 2060			
1000	3993.4	1701.0	3940 4060	ho Unit	227	28 ±0.2
1500	6007.0	6012.0	5940 6060	Variation		
2000	8008.0	P110.7	7940 060			
2500	10,000	9998.5	I			

X ACCEPT

I. LINEARITY, HISTERESIS, @ 150 1 5°F (MOTES 1 4 2)

PRESSURE	OUTPUT IN UNITS		LINEARITY	HISTERES IS	RECORD EXCITATION	EXCITATION
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	VOLTAGE	TOLERANCE
0	0	0	r			
500	1993.0	1987.5	957.5 19 10 206 0			
1000	1.000.0	3995.0	3940 4060	40 Unit	25.7	28 ± 0.2
1500	6010.8	6006.9	5940 6 0 60	Variation		
2000	8016.5	6013.7	7940 3060		i	
2500	10,000	9999.8	I			

I ACCEPT

II. ZERO OUTPUT (NOTES 4 4 5)

FUNCTION	007P07 @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 3025°F	EXCITATION VOLTAGE	007 PUT @ 150-5 °F	FRICITATION FOLTAGE	TO LERANCE TO LERANCE TO LERANCE
ZERO OUT PUT IN MILLIVOLT	▲ 28m v	28₹	7.5mv	2=7	28.fm¥	257	
ZERO OUTPUT TOLERANCE	-b +102mv	I	A.155 WY	I	A±85 av	x	28 ± 0.2 VDC

I ACCEPT

Calibration After Pressure Shock Test. Transducer SN 703

Report 0162-01DR-26

KEROJET-GENERAL CORPORATION

Page 5 of 5

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 1-9-63

(SV OUTPUT)			8/K_	8/ x			
PUNCTION	OUT PUT	EXCITATION VOLTAGE	OUTFUT 0 30±5°F	EXCITATION VOLTAGE	007 PUT 015025°F	EICITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE	
P.S.QUT- PUT (PSIG) IN VOLTS	5.038V	28 V	5.029₹	28 V	5.0177	28♥		
Di volta	57.8mv	28 V	35.7mv	287	57.33mv	284	28 ± 0.2	
CORRECTED F_S_OUTPUT IN VOLTS	≜ 4.980	28 V	ե.993	28 V	4.959	28V	∀DC	
P.S.OUTPUT COLUMN A	5 ± 0.1 ¥	x	A ± .0557	I	A 2 .085V	I		

X ACCEPT

GENERAL NOTES:

- a. All readings shall be taken at 75 1 5°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 10.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. I = not applicable.
- e. A 5-minute warmap time is required for each transducer.
- These calibration data sheets shall be used with the latest revision of Asrojet Calibration Procedure ACP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type $^{\circ}C^{\circ}$ calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to sero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer zero output (test II) shall be recorded at 5.0 mm Hg or less.
- 5. Hegative voltage reading shall not be accepted at 75 ± 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 peig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 peig and record the difference in column A as full scale output at each temperature point.

Calibration After Pressure Shock Test, Transducer SN 703

ST 3083A DATE: 9-17-62 RANGE: 2500 PSI (57 OUT		EAS 99 9A	ral corporation DKST PLANT OPERATIONAL TRANSDUCER		Page 1 of 5
MFG. Statham			55,	TEST CALIBRA	
MODEL PASSATO		CALIBRATED BY	Dept. 8772	DATE	12-5-62
RCOM TEMP. 74		assigned !	O ENGINE NO	ul Fi-112	
BAROMETRIC PRESSURE					
			CHECKED BY	Ken Bo	sney
X ACCEPTED (NOTE g)			ASSIGNED BY	Dept. R. S. L	8772 . eeds
NO VISIBLE DAMAGE REMARKS X ACCEPT II. CASE INSUI BETWEEN RES CASE & PINS IN	ATION		III. (CIPCUIT ISOLAT	MCE TOTERANCE
	1,710#			k B-C 10,000	1 Magaha
В 1	0,000%				
c 1		1 Megohm Minimum	Х	ACCEPT	
2 م	0,130%	.TIII MUM			
E 1	0,120X				
F 1	0,000%				
X ACCEPT	IV. PR READIN MILLIA		EYPTT ATTOM	TOLERANCE	

Pretest Calibration, Transducer SN 703 (Motor 44FW-112)

70 MA Max

X ACCEPT

28±0.2VDC

ABROJET -GENERAL CORPORATION SOLID ROCKET PLANT

MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 12-5-62

s/N 703

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		0VERPRE 3750 ±10		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLI'S	FULL SCALE FULL SCALE OUTPUT IN OUTPUT IN TOLERANCE VOLTS VOLTS		TOLERANCE	ZERO OUTPUT IN MILLIVOLIS	FULL SCALE OUT PUT IN VOLTS
77.5	5.052	6.581	7.50V MAXIMUM	68.4	5.0ևև

X ACCEPT

ST 3083A

DATE: 9-17-62

RANGE: 2500 PSIA ONLY

(זטיודטס על)

VI. RESIDUAL NOISE

MILLIVOLT (PRAK TO PEAK) READING @ F.S.	TOLERANCE
10	25 MV MAXIMUM

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY

(5V OUTPUT)

AZROJET-GENERAL CORPORATION SOLID ROCKET PLANT NIMUTEMAN OPERATIONAL PRESSURE TRANSDUCER

Page 3 of 5

DATE 12-5-62

3/N 703

VII. LINEARITY, HYSTERESIS, REPEATABILITY 0 75 2 5°F (NOTES 1 4 2)

PRESS URE		IN UNITS	LINEARITY	HYSTERESIS	REPEAT -	EXCITATION	EXCITATIO	
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	TOLEANCE	VOLTAGE	TOLERANCE	
0	+1							
500	1998	1998	1940 2060	40 Unit	40 Unit 20			
1000	4010	L209	3940 4060					
1500	6016	6017	5940 6060	Variation				
2000	8019	5020	7940					
2500	10,000	9998	I					
0	-1		I					
500	1998	1998	1940 2060		Maximum	28	28 ± 0.2	
1000	4010	4008	3940 4060	LO Unit	Deviation From			
1500	6015	5016	5940 6060	Variation	Average of Three			
2000	8018	5020	7940 8060		Cycles			
2500	9998	9998	I		20 Units			
0	-1		I					
500	1998	1996	1940 2060			29		
1000	4209	L207	3940 4060	40 Unit				
1500	6015	5016	5940 6060	Variation				
2000	8019	5028	7940 8060					
2500	9998	9995	x					
A.	. LINEARITY		B. HYS	TRESIS	9	. REPEATABI	LITY	

VIII. SHUNT CALIBRATION (NOTE 3)

4111	Shout	CALIE CALION	(3012)/		
% FULL	OF SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
7	5	7512	7,475 7,525	28	28±0.2

AEROJET-GETERAL CORPORATION SOLID ROCKET PLANT

Page 4 of 5

MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER 12-5-62

DATE

s/N ______

X. LINEARITY, HYSTERESIS. @ 30 2 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT :	IN UNITS	LINEARITY TOLERANCE	HISTERES IS TOLERANCE	RECORD EXCITATION VOLTAGE	ACT TATION
	-6	THOUSAND THE	TOLESCHIOE	TOLISTATION	YOLTAGE	TOLERANCE
0	-0		I			
500	1994	1992	1940 2060			
1000	4205	7208	3940 4060	40 Unit	28	28 10.2
1500	6012	6017	5940 6060	Variation	۷,	∀DC
2000	H012	8018	7940 6660			
2500	10,000	17976	I			

X ACCEPT

I. LINEARITY, HYSTERESIS, @ 150 1 5°F (NOTES 1 & 2)

PRESSURE	OUTPUT	IN UNITS	LINEARITY	HYSTERES IS	RECORD EXCITATION	KICITATION
(ESIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	VOLTAGE	VOLTAGE TOLFRANCE
0	2		x			
500	1993	1990	1 <i>9</i> 40 2060			
1000	7201	3999	3940 4060	40 Unit	28	28 ± 0.2 VDC
1500	6007	5007	5940 6060	Variation		
2000	8014	5013	7940 8060			
2500	10,000	2998	I			

X ACCEPT

MI. ZERO OUTPUT (NOTES h & 5)

FUNCTION	007707 @ 7525°F	EXCITATION VOLTAGE	00TP0T 0 3025°F	EXCITATION VOLTAGE	0स्त हम e 150±5°F	FEXCITATION VOLTAGE	VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A _{+39.7}	28	+33.0	28	+30.3	28	
ZERO OUT PUT TOLERANCE	-b +102mv	I	A255 W	I	A±85 =v	I	28 ± 0.2 VDC

MEROJET-GENERAL CORPORATION

Page 5 of 5

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 12-5-62 S/N 703

(5V OUTPUT)

II. FULL SCALE OUTPUT (NOTE 6)

PUNCT ION	007 PUT @ 75-5°F	EXCITATION VOLTAGE	00TPUT • 3025*F	EXCITATION VOLTAGE	OUT PUT 015025°F	VOLTAGE VOLTAGE	VOLTAGE TOLERANCE
P.S.OUT- PUT (PSIG) IN VOLTS	5.01.6	25	5.043	56	f.0170	28	
ZKBO OUT - PUT (PAIA) IN VOLTS	. 1691	24	.~600	2°	.9618	28	28 2 0.2
CORRECTED F.S.OUTPUT IN VOLTS	4.377	2 ^p	9º3	25	4.9552	28	₹DC
P.S.OUTPUT COLUMN A TOL.	5 ± 0.1 ¥	x	A : .055V	I	± ± .085₹	I	

ACCEPT

GENERAL NOTES:

- a. All readings shall be taken at 75 1 5°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c, 10,000 units shall equal 100% full scale transducer reading.
- d. I = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- f. These calibration data sheets shall be used with the latest revision of Asrojet Calibration Procedure ACP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type 8 C 8 calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to zero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer sero output (test II) shall be recorded at 5.0 mm Hg or less.
- 5. Hegative voltage reading shall not be accepted at 75 2 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Report 0162-01DR-26

ST 3 DATE RANG	3083A E: 9-17-6 GE: 2500 (57	2 PSIA ONLY OUTPUT)	Bolid R Hinuteha	MERAL CORPORATION COCKET PLANT N OPERATIONAL E TRANSDUCER	P.O.#_	
				703 Pept. 8772	TEST CALLE RANGE	PATION 0-2500 bsia
DEL	PA334TC		CALIBRATED B	T Dept. 8772	DATE	1-31-63
ом тені	P	<u>ц</u>	ASS TONED	TO ENGINE NO.	ЦЦ FW-112	
				PARAM		
				CHECKED BY_	Ken	Bushey
Γ					N	
VISUA NO VI REMAR	ACCEPT ACCEPT ACCEPT	g) 		ASSIGNED BY_	R. E.	. 6772 Leeds
VISUA NO VI REMAR	AL INSPECT ISIBLE DAM RES ACCEPT	g) ION AGE DUE TO SE		ASSIGNED BY_	R. E.	Leeds
VISUA NO VI REMAR	AL INSPECT: ISIBLE DAM RES ACCEPT I. CASE IN	g) ION AGE DUE TO SE		ASSIGNED BY_ NO, PACKAGING, ETC	R. E.	ATION TANCE TOLERANCE
VISUA NO VI REMAR	AL INSPECT ISIBLE DAM RES ACCEPT CASE IN BETWEEN CASE & PINS	ION AGE DUE TO SE SULATION RESISTANCE IN MEGOHMS 10,000M	HIPPING, HANDLI	ASSIGNED BY_ NO, PACKAGING, ETG III. C1 BETWE	R. E.	ATION TANCE TOLERANCE
VISUA NO VI REMAR	AL INSPECT ISIBLE DAM RES ACCEPT CASE IN BETWEEN CASE & PINS	g) ION AGE DUE TO SH ISULATION RESISTANCE IN MEGOHMS	HIPPING, HANDLI	ASSIGNED BY_ NO, PACKAGING, ETC HII. CI BETWE PINS A-D &	R. E. R. E. RESIS IN ME B-C 10,0	Leeds ATION TANCE TOLERANCE COMMS 1 Megohm
VISUA NO VI REMAR	AL INSPECT ISIBLE DAM RES ACCEPT I. CASE IN BETWEEN ASE & PINS A	ISULATION RESISTANCE IN MEGOHMS 10,000M	HIPPING, HANDLI	ASSIGNED BY_ NO, PACKAGING, ETG III. C1 BETWE	R. E. R. E. RESIS IN ME B-C 10,0	Leeds ATION TANCE TOLERANCE COMMS 1 Megohm
VISUA NO VI REMAR	AL INSPECT ISIBLE DAM RES ACCEPT CASE IN BETWEEN CASE & PINS A B	ION AGE DUE TO SE SULATION RESISTANCE IN MEGOHMS 10,000M 12,000M	TOLERANCE	ASSIGNED BY_ NO, PACKAGING, ETC HII. CI BETWE PINS A-D &	R. E. R. E. RESIS IN ME B-C 10,0	Leeds ATION TANCE TOLERANCE COMMS 1 Megohm
VISUA NO VI REMAR	AL INSPECT ISIBLE DAM RKS ACCEPT I. CASE IN BETWEEN CASE & PINS A B	ISULATION RESISTANCE IN MEGOHMS 10,000M	TOLERANCE	ASSIGNED BY_ NO, PACKAGING, ETC HII. CI BETWE PINS A-D &	R. E. R. E. RESIS IN ME B-C 10,0	Leeds ATION TANCE TOLERANCE COMMS 1 Megohm

IV.	PRIMARY	POWER	CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
П 5	70 MA Max.	29	28±0.2VDC

ST 3083A

DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

1-31-63 DATE_ 793 s/N ____

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

BEFORE O	FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		overpressure 3750 10 psia		ENCE ONLY RPRESSURE ADINGS
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUT PUT IN VOLTS
69.5	5.048	6.6և7	7.50V MAXIMUM	63.6	5.045

ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
14	25 NV MAXIMUM

ACCEPT

Posttest Calibration, Transducer SN 703 (Motor 44FW-112)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL

DATE 1-31-63

s/N_

PRESSURE TRANSDUCER

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

BEFORE O	FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 10 PSIA		ENCE ONLY RPRESSURE ADINGS
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUT PUT IN VOLTS
69.5	5.048	6.647	7.50V MAXIMUM	63.6	5.045

X ACCEPT

ST 3083A

DATE: 9-17-62

RANGE: 2500 PSIA ONLY

(5V OUTPUT)

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
14	25 MV MAXIMUM

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

Page 3 of 5 1-31-63 DATE 703 3/1

VII. LINEARITY, HYSTERESIS, REPRATABILITY @ 75 \$ 5°F (NOTES 1 4 2)

PRESS URB		IN UNITS	LINEARITY	hysteres is	REPEAT -	EXCITATION	VOLTAGE TOLERANCE		
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	TOLERANCE.	VOLTAGE	TOLERANCE		
0 .	0		X.]					
500	2000	1995	1940 2060	40 Unit				28	
1000	4007	12005	3940 4060						
1500	6014	6009	5940 6060	Variation					
2000	8018	8014	7940 8060						
2500 .	10,000	9996	x						
0	-1		1		Maximum		28 ± 0.2 VDC		
500	1998	1994	1940 2060			28 28 VIX			
1000	4006	4003	3940	40 Unit	Deviation From				
1500	6012	6007	4060 5940 6060	Variation	40 444				
2000	8016	8013	6060 7940 8060						
2500	9996	9995	I		20 Units				
0	-1		I						
500	1996	1993	1940 2060						
1000	4005	<u>L</u> ∞1	3940 4060	40 Unit		28			
1500	6007	6006	5940 6060	Variation		28			
2000	8013	8011	7940 8060						
2500	9995	9993	ı						

X ACCEPT

ACCEPT

X ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

	***************************************	1201- 27		
% OF FULL SCALE	75 25 °F	SHUNT TOLERANCE	BXC IT AT ION	TOL
75	7503	7,475 7,525	28	28±0.2 VDC

ACCEPT

AEROJET-GENERAL CORPORATION

SOLID ROCKET PLANT MINUTEMAN OPERATIONAL

PRESSURE TRANSDUCER

Page 4 of 5

1-31-63 DATE

703 S/N

IX. LINEARITY, HYSTERESIS, @ 30 2 5°F (HOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT DECREASING	IN UNITS INCREASING	LINEARITI TOLERANCE	HISTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	0		I			
500	1999	1996	1940 2060			
1000	4208	FW6	3940 4060	40 Unit		28 ±0.2
1500	6013	6013	5940 6060	Variation		
2000	8015	8017	7940 7940			
2500	10,000	9998	Ī			

ACCEPT

I. LINEARITY, HYSTERESIS, @ 150 ± 5°F (HOTES 1 & 2)

PRESSURE	OUTPUT	IN UNITS	LINEARITY	HYSTERES IS	RECORD EXCITATION	RICHATION
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	VOLTAGE	VOLTAGE TOLERANCE
0	0		I		701	
500	1992	1988	1940 2060			
1000	4001	3997	3940 4060	40 Unit		28 ± 0.2
1500	6007	6002	6060 53/10	Variation		
2000	8013	8011	7940 8060			
2500	10,000	9997	I			

ACCEPT

II, ZERO	OUTPUT (NOT	(BS 4 & 5)					
FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	00TPUT @ 3025°F	EXCITATION VOLTAGE	0th Put 0 150±5°7	VOLTAGE	VOLTAGE TOLERANCE
ZERO OUT PUT IN MILLIVOLT	A 34.3	28	31.8	28	23.5	28	
ZERO OUT PUT TOLERANCE	-b +102mv	I	A255 my	I	A=85 mv	X	28 ± 0.2 VDC

Page 5 of 5 AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT 1-31-63 DATE: 9-17-62 RANGE: 2500 PSIA ONLY MINUTENAN OPERATIONAL DATE PRESSURE TRANSDUCER 703

	SCALE OUTF	UT (NOTE 6)		5/8				
FUNCTION	007 P07 0 75-5°F	EXCITATION VOLTAGE	007707 • 3025°7	VOLTAGE	007 FUT 015025°F	VOLTAGE	VOLTAGE TOLERANCE	
P.S.OUT- PUT (PSIG) IN VOLIS	5.037	28	5.7570	28	5.0070	28		
ZISBO OUT - IN VOLES	.9630	28	.0605	28	.0539	28	28 ± 0.2	
CORRECTED F.S.OUTPUT IN VOLTS	▲ 4.9740	28	4.9895	28	4.9531	28	∀DC	
P.S.OUTPUT COLUMN A TOL.	5 ± 0.1 ¥	x	A ± .0557	I	A ± .0857	ı		

ACCEPT

ST 3083A

GENERAL NOTES:

- a. All readings shall be taken at 75 15°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. X = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- f. These calibration data sheets shall be used with the latest revision of Asrojet Calibration Procedure ACP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 peig pressure and range type "C" calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to zero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer zero output (test II) shall be recorded at 5.0 mm Hg or less.
- 5. Hegative voltage reading shall not be accepted at 75 ± 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 paig and record the difference in column A as full scale output at each temperature point.

	ST 3083A DATE: 9-17- RANGE: 2500 (57	.62 PSIA ONLY OUTPUT)	kerojet - 80li Minut Pres	GENERAL C D ROCKET EMAN OPER SURE TRAN	orporation Plant Ational Sducer	P.O.#	Page 1 of 5
					D Hill	OT CALIBRATI	
MPG.	Statham		SERIAL NO		3	RANGE	n-2500 nsia
MODE	PA334TC	-2.5M	CALIBRATE	D BY	Dept. 8772	DATE	1-16-63
ROOM	TEMP.	-2.5M	A.SS 10:	NED TO EN	DINE NO.	LL FW-113	
BARO	METRIC PRESSU	RE	59.0 MM H	0	PARAN	ETER MEASURE	D Igniter Pressur
				(CHECKED BY	Ken Bush	ey
	L. ACCE	מוס ישם				Ken Bush	8772
	X ACCE	Eg)		A.	SSIGNED BY	R. E. Leed	5
	X ACCEPT	:					
	II. CASE			1		IRCUIT ISOLA	
	CASE & PI	RESISTANCE IS IN MEGOHMS	TOLERANCE		BETW		
	A	10,000M			A-D &	B-C 17,000	M l Megohm Minimum
	В	10,000M			[Ψ]	a de la m	
	С	10,000M	1 Megohm Minimum		X A	CCEPT	
		10,000M	· ALIA III (DA				
	E	10,000M					
	F	10,000M					

IV. PRIMARY POWER CURRENT

2.1	10		
READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
40.5	70 MA Max.	28	28±0,2VDC

X ACCEPT

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 1-16-63

S/N 493

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

BEFORE O	FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		SURE) PSIA		ENCE ONLY RPRESSURE ADINGS
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUT PUT IN YOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUT PUT IN VOLTS
82.4	5.064	6.785	7.50V MAXIMUM	79.2	5.063

I ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
13 mv	25 MV MAXIMUM

ST 3083A

DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

Page 3 of 5 1-16-63 DATE 493 3/N

(PSIG)	DECREASING	IN UNITS	LINEARITY TOLERANCE	HYSTERES IS TOLERANCE	ABILITY TOLERANCE	EXCITATION VOLTAGE	VOLTAGE TOLERANCE			
0	-3		x		10112:41015					
500	2010	2001	1940 2060	liO Unit	l					
1000	4028	4020	3940 4060		lia Unit	liO Unit	hO Unit	40 Unit	Init	28
1500	6040	6033	5940 6060	Variation		20				
2000	8037	8033	7940 8060]			1			
2500	10,000		I							
0	- 3		ı			1 28 1	28 ± 0.2 VDC			
500	2008	2006	1940 2060		Maximum					
1000	<u> </u>	7757	3940 4060	40 Unit	Deviation From					
1500	6038	6033	5940	Variation	Variation Average of					
2000	8038	8033	6060 7940 8060	Three Cycles						
2500	10000	10000	X		20 Units					
0	-3		x							
500	2005	2004	1940 2060							
1000	4026	<u> </u>	3940 4060	40 Unit		0.0				
1500	6037	6030	5940 6060	Variation		28				
2000	8035	8033	7940 8060							
2500	10000	10000	x							

X ACCEPT

ACCEPT

ACCEPT

SHINT CALIBRATION (NOTE 3)

١	TIT.	SHOWI	CALIBRATION	(MOLE 2)		
	% FULL	OF SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
		75	7496	7,475 7,525	28	28±0.2

X ACCEPT

Pretest Calibration, Transducer SN 493 (Motor 44FW-113)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

Page 4 of 5 1-16-63 DATE

493 S/N

LINEARITY, HYSTERESIS, @ 30 1 5°F (NOTES 1 & 2)

PRESSURE	OUTPUT IN UNITS		LINEARITY	HYSTERESIS	RECORD EXCITATION	VOLTAGE ON
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	VOLTAGE"	TOLERANCE
0	0		ı]	28	
500	2003	2010	1940 2060			
1000	4030	4033	3940 4060	hO Unit		28 ±0.2
1500	6040	6042	5940 6060	Variation		ADC
2000	8036	8042	7940			
2500	10,000	2997	I			

ACCEPT

I. LINEARITY, HYSTERESIS, @ 150 1 5°F (MOTES 1 & 2)

PRESSURE	OUTPUT IN UNITS		LINEARITY	HYSTERESIS	RECORD EXCITATION	EXCITATION
(ES10)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	VOLTAGE	VOLTAGE TOLERANCE
0	-2	-2	x			-200
500	2009	2000	1940 2060			ĺ
1000	4020	4012	7090 3340	40 Unit		28 ± 0.2
1500	6034	6023	5940 6060	Variation		∀ DC
2000	8034	8030	7940 8060			
2500	10,000	9998	X			

ACCEPT

III. ZERO	ourrur (wor	TES 4 4 5)					
FUNCTION	OUTPUT © 75±5°F	EXCITATION VOLTAGE	OUTPUT a 3025°F	EXCITATION VOLTAGE	0trpur 0 150±5°F	FEXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	+49.7	28	59.7	28	27.2	28	
ZERO OUT PUT TOLERANCE	-5 +102mv	I	A255 EV	I	A±85 mv	X	28 ± 0.2 VDC

Report 0162-01DR-26

MEROJET-GENERAL CORPORATION

Page 5 of 5 SOLID ROCKET PLANT 1-16-63 MINUTEMAN OPERATIONAL

DATE: 9-17-62 RANGE: 2500 PSIA ONLI PRESSURE TRANSDUCER (5V OUTPUT)

DATE.		
S/N	493	
9/11		

FUNOT ION	OUTPUT 0 75-5°F	VI (NOTE 6) EXCITATION VOLTAGE	001701 e 3025°7	EXCITATION VOLTAGE	OUTPUT @15025°F	VOLTAGE VOLTAGE	EACT ATTON VOLTAGE TOLERANCE
P.S.OUT- PUT (PSIG) IN VOLTS	5.057	28	۲.977	28	5.025	28	
ZKRO OUT - POT (PSTA)	.0759	28	.0883	2 ^R	. 2561	28	28 ± 0.2
CORRECTED F.S.OUTPUT IN VOLTS	4 4.9 ⁸⁸ 1	28	L.9887	28	19689	28	V DC
P.S.OUTPUT COLUMN A TOL.	5 ± 0.1 ¥	I	A ± .055V	ı	4 ± . 085₹	I	

X ACCEPT

ST 3083A

GENERAL NOTES:

- a. All readings shall be taken at 75 15°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. X = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- f. These calibration data sheets shall be used with the latest revision of Asrojet Calibration Procedure ACP 4-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to mero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer sero output (test XI) shall be recorded at 5.0 mm Hg or less.
- 5. Negative voltage reading shall not be accepted at 75 ± 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 paig and record the difference in column A as full scale output at each temperature point.

$Report\ 0162\text{-}01DR\text{-}26$

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)	Abrojet - Genei Solid Roc Minuteman Pressure	RAL CORPORATION INST PLANT OPERATIONAL TRANSDUCER	P.O.#	
MRA Statham	SERTAL NO	1,03	THOSE CATERRATIO	nsia
MFO. Statham PA3314TC	DERING NO	D 9770	1_3	
	CALIBRATED BY			,1-0)
ROOM TEMP. 74 BAROMETRIC PRESSURE				miter ^p ressu
X ACCEPTED (NOTE g)		CHECKED BY	Ken Bushe Dept. 8772 R. E. Leed	s
	O SHIPPING, HANDLING	, PACKAGING, ETC.		
I. VISUAL INSPECTION NO VISIBLE DAMAGE DUE T REMARKS X ACCEPT II. CASE INSULATION		III. CI	CUIT ISOLATION	
I. VISUAL INSPECTION NO VISIBLE DAMAGE DUE T REMARKS X ACCEPT	CE	III. CI:		
I. CASE INSULATION IN VISIBLE DAMAGE DUE TO REMARKS X ACCEPT II. CASE INSULATION BETWEEN RESISTAN	CE TOLERANCE	III. CI: BETWEE PINS	CUIT ISOLATION	
I. CASE INSULATION II. CASE INSULATION BETWEEN RESISTAN CASE & PINS IN MEGOR	CE TOLERANCE	III. CIS	RCUIT ISOLATION TN RESISTANCE IN MEGORNS 3-C 10,000M	1 Megohm
I. CASE INSULATION II. CASE INSULATION BETWEEN RESISTAN CASE & PINS IN MEGOH A 10,000	CE TOLERANCE	III. CI: BETWEE PINS	RCUIT ISOLATION TN RESISTANCE IN MEGORNS 3-C 10,000M	1 Megohm
I. CASE INSULATION TO VISIBLE DAMAGE DUE TO REMARKS X ACCEPT II. CASE INSULATION BETWEEN RESISTAN CASE & PINS IN MEGON A 10,000M B 10,000M	CE TOLERANCE	III. CIS	RCUIT ISOLATION TN RESISTANCE IN MEGORNS 3-C 10,000M	1 Megohm
I. VISUAL INSPECTION NO VISIBLE DAMAGE DUE TREMARKS X ACCEPT II. CASE INSULATION BETWEEN RESISTAN CASE & PINS IN MEGOH A 10,000h B 10,000h	CE TOLERANCE 1 1 Megoha Minimum	III. CIS	RCUIT ISOLATION TN RESISTANCE IN MEGORNS 3-C 10,000M	1 Megohm

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
40	70 MA Max.	28	28±0,2VDC

X ACCEPT

Posttest Calibration, Transducer SN 493 (Motor 44FW-113)

AEROJET-GENERAL CORPORATION

SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 1-31-63

s/N 493

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

BEFORE O	FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 10 PSIA FULL SCALE		ENCE ONLY RPRESSURE ADINGS
ZERO OUTPUT IN MILLIVOLTS	ZERO OUTPUT FULL SCALE		TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUT PUT IN VOLITS
83.9	5.062	6.783	7.50V MAXIMUM	80.3	5.064

X ACCEPT

ST 3083A

DATE: 9-17-62 RANGE: 2500 PSIA ONLY

(5V OUTPUT)

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
14	25 HV MAXIMUM

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT

MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

Page 3 of 5

1-31-63 DATE

493 S/N

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 * 5°F (NOTES 1 & 2)

PRESSURE		IN UNITS	LINEARITY	HYSTERESIS	REPEAT -	EXCITATION	EXCITATIO			
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	TOLERANCE.	VOLTAGE	TOLERANCE			
0	0		1							
500	2010	2004	1940 2060	µО Unit Variation	ho Unit					
1000	4027	4018	3940 4060			40 Unit	LO Unit	40 Unit		28
1500	6036	6030	5940 6060							
2000	8036	8029	7940 8060							
2500	10,000	9996	x							
0	0		x			ation 28	28 ± 0.2			
500	2009	2002	1940 2060		Maximum Deviation From Average of Three Cycles 20 Units					
1000	4026	ե017	14060 14060	I/O Ifinite						
1500	6036	6028	5940							
2000	8033	8027	6060 7940 8060							
2500	9996	9995	I							
0	0		I			-				
500	2009	2002	1940 2060			28				
1000	4025	4017	7090 7090	40 Unit						
1500	6034	6028	5940 6060	Variation						
2000	8032	8026	7 <i>9</i> 40 8060							
2500	9995	9995	x							

ACCEPT

ACCEPT

ACCEPT

;	III. SHUNT	CALIBRATION	(NOTE 3)		
	% OF FULL SCALE	75 ± 5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
	75	7497	7,475 7,525	28	28 ± 0.2 ∀DC

ACCEPT

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER Page 4 of 5 1-31-63

DATE

S/N

x. Linearity, hysteresis, • 30 ± 5°F (notes 1 & 2)

PRESSURE	OUTPUT IN UNITS		LINEARITI	HISTERESIS	RECORD EXCITATION	VOLTAGE ON
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	VOLTAGE	TOLERANCE
0	0		ı		28	
500	22011	1997	1940 2060]		28 ±0.2
1000	կე27	J719	3940 4060	hO Unit		
1500	6038	6033	5940 6060	Variation		
2000	8034	8032	7940 0060			
2500	10,000	9998	I			

X ACCEPT

I. LINEARITY, HYSTERESIS, @ 150 1 5°F (HOTES 1 & 2)

PRESSURE	URE OUTPUT IN UNITS		LINEARITY	HYSTERES IS	RECORD EXCITATION	LCCT AT LON	
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	VOLTAGE	VOLTAGE TOLERANCE	
0	0		I				
500	2005	1997	1940 2060				
1000	4019	7010	3940 4060	40 Unit		28 ± 0.2 VDC	
1500	6030	6020	5940 6060	Variation			
5000	8033	8028	7940 8060				
2500	10,000	9998	I				

X ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	0UTPUT @ 3025°F	EXCITATION VOLTAGE	our pur e 150±5°F		EXCITATION VOLTAGE TOLERANCE
ZERO OUT PUT IN MILLIVOLT	48.9	28	60.9	28	29.2	28	
ZERO OUT PUT TOLERANCE	-b +102mv	I	A255 mv	x	A-85 mv	X	28 ± 0.2 VDC

AUROJET-GENERAL CORPORATION

SOLID ROCKET PLANT MINUTEMAN OPERATIONAL

Page 5 of 5 1-31-63 DATE

PRESSURE TRANSDUCER

493 SM

	(5V OUTPUT)		s/n					
FUNCTION	our pur e 75-5°F	EXCITATION VOLTAGE	output © 3025°F	EXCITATION VOLTAGE	OUT PUT @15025°F	EXCITATION VOLTAGE	VOLTAGE TOLERANCE	
F.S.OUT- PUT (PSIG) IN VOLTS	5.745	28	5.7737	5¢	5.0260	28		
ZERO OUT - POT (PSIA) IN VOLTS	.∵ [™] 3	2н	. 1903	29	.6595	28	28 2 0,2	
CORRECTED F.S.OUTPUT IN VOLTS	A 4.9767	2º	հ.9 ⁸ 2 7	28	4.9665	28	VDC	
P SOUTPUT COLUMN A TOL.	5 ± 0.1 ¥	x	A ± .055V	I	A ± .085₹	I		

X ACCEPT

5T 3083A

DATE: 9-17-62 RANGE: 2500 FSIA ONLI

GENERAL NOTES:

- a. All readings shall be taken at 75 15°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. K = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- f. These calibration data sheets shall be used with the latest revision of Asrojet Oalibration Procedure ACP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

- 1. Balance transducer cutput to saro at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to sero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer zero output (test II) shall be recorded at 5.0 mm Hg or less.
- 5. Negative voltage reading shall not be accepted at 75 ± 5°F.
- 6. Read and record transducer cutput voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 paig and record the difference in column A as full scale output at each temperature point.

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)	Merojet -genera 80LID rock Minuteman o	L CORPORATION ET PLANT PERATIONAL		Page 1 of 5
(5V OUTPUT)	PRESSURE T	RANSDUCER	P.O.#	
MFG. Statham		PRE-TEST	CALIBRATION RANGE	
	CALIBRATED BY_			
ROOM TEMP. 74	CKLIBOTED BI_		ATA LL FW-88	······································
				Tomat A and Donas and
BAROMETRIC PRESSURE 749.3	мм но	PARAMI	ETER MEASURET	Ipniter Pressure
		CHECKED BY_	Ken Bushe	ey
ACCEPTED (NOTE g)		ASSIGNED BY	Dept. 8 R. E. Leeds	772
NO VISIBLE DAMAGE DUE TO SHI REMARKS X ACCEPT II. CASE INSULATION	PPING, HANDLING,		RCUIT ISOLAT	ION
BETWEEN RESISTANCE CASE & PINS IN MEGOHMS	OLERANCE	BETWE	TEN RESISTA IN MEGO	
A 10,000M		i	B-C 10,000	1 Manaha
в 10,000М				LITTITUUM
c 10,000M	1 Megohm	X AC	CEPT	
n 10,000M	Table III Com			
B 10,000M				
F				
X ACCEPT				

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
42	70 MA Max.	28	28±0.2VDC

ST 3083A

DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 1-31-63

S/N 703

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

BEFORE O	RENCE ONLY VERPRESSURE EADINGS	0VERPRES 3750 ±10			ENCE ONLY RPRESSURE ADINGS
ZERO OUTPUT FULL SCALE OUTPUT IN IN MILLIVOLTS YOLTS		FULL SCALE OUT PUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUT PUT IN VOLTS
69.5	5.048	6.647	7.50V MAXIMUM	63.6	^к . Օև5

ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) PEADING @ F.S.	TOLERANCE
1և	25 MV MAXIMUM

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER Page 3 of 5

DATE 1-31-63

S/N 7^3

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 * 5°F (NOTES 1 & 2)

PRESSURB		מדואט אן	HYSTERESIS	REPEAT -	EXCITATION	EXCITATION VOLTAGE			
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	ABILITY TOLERANCE	VOLTAGE	TOLERANCE		
. 0	0								
500	2000	1995	1940 2060	μ0 Unit Variation	40 Unit				
1000	1,007	4115	3940 4060				28		
1500	6011;	6009	5940 6060						
2000	H018	e-714	7940 8060						
2500	10,000	9996	X						
0	-1		x				28 ± 0.2		
500	199 ⁸	1994	1 <i>9</i> 40 2060	40 Unit Variation					
1000	1,006	1,203	3940 4060						
1500	6012	6007	5940 6060						
2000	⁶ 716	⁸ 13	7940 8060						
2500	9996	9995	I						
0	-1		I						
500	1996	1993	1940 2060						
1000	4205	u101	3940 4060	40 Unit Variation					
1500	6007	6006	5940 6060			28			
2000	8013	8011	7940 8060						
2500	9995	9993	x						
A	. LINEARITY		B. HYS	TERES IS	(. REPEATABI	LITY		
	X ACCEPT		X A	CCEPT	ſ	X ACCEPT			

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75 ± 5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7573	7,475 7,525	25	28±0.2 VDC

ST 3083A

DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION

SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER Page 4 of 5

1-31-63 713

S/N

IX. LINEARITY, HYSTERESIS, @ 30 1 5°F (NOTES 1 & 2)

PRESSURE (PSIG)		IN UNITS INCREASING	LINEARITY TOLERANCE	HISTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	0		I			
500	1999	1796	1940 2060			
1000	4008	4006	3940 4060	ho Unit		28 ±0.2
1500	6013	6013	5940 6060	Variation		ADC
2000	8015	8017	7940 8060]		
2500	10,000	9998	ı			

ACCEPT

I. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE	OUTPUT IN UNITS		LINEARITY	HYSTERES IS	RECORD EXCITATION	EXCITATION VOLTAGE
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	VOLTAGE	TOLERANCE
0	0		I		28	28 ± 0.2
500	1992	1988	1940 2060			
1000	<u>µ</u> 201	3997	14090 14090	40 Unit		
1500	6007	6002	5940 6060	Variation		
2000	8013	8011	7 <i>9</i> 40 8060			
2500	10,000	9997	x			

ACCEPT

410 WALL	OUTSOI (HOT	ED 4 08 31					
FUNCT ION	OUTPUT	EXCITATION VOLTAGE	output 9 3025°F	excitation voltage	0trpvr 0 150±5°r	VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUT PUT IN MILLIVOLT	A _{34.3}	28	31.8	28	23.5	28	
ZERO OUT PUT TOLERANCE	-0 +102m	I	A255 my	x	A±85 mv	X	28 ± 0.2 VDC

MEROJET-GENERAL CORPORATION

SOLID ROCKET PLANT MINUTEMAN OPERATIONAL

DATE 1-31-63

Page 5 of 5

DATE: 9-17-62 MINUTEMAN OPERATIONAL RANGE: 2500 PSIA ONLY PRESSURE TRANSDUCER (5V OUTPUT)

s/x ⁷⁰³

FUNCTION	001 PUT • 75-5°F	EXCITATION VOLTAGE	00TPUT • 3025°F	EXCITATION VOLTAGE	OUTPUT 015025°F	EICITATION VOLTAGE	VOLTAGE TOLERANCE
P.S.OUT- PUT (PSIG) IN VOLTS	5.037	28	5.0500	28	5.0070	28	
ZABO (OUT - IN VOLTS	.0630	28	.0605	28	.0539	28	28 ± 0.2
CORRECTED 5.8.OUTPUT IN VOLTS	↓ 4.9730	28	4.9895	28	4.9531	28	∀ DC
COLUMN A	5 ± 0.1 ¥	x	A ± .055V	I	A ± .085V	I	

X ACCEPT

5T 3083A

GENERAL NOTES:

- a. All readings shall be taken at 75 1 5°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. I = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- These calibration data sheets shall be used with the latest revision of Asrojet Galibration Procedure ACP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

- 1. Balance transducer output to sero at atmospheric pressure, apply 2500 paig pressure and range type "C" calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to sero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer sero output (test XI) shall be recorded at 5.0 mm Hg or less.
- 5. Hegative voltage reading shall not be accepted at 75 ± 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

ST 30 DATE: RANGE	: 2500 1	PSIA OHLY	MINUTEMA	ERAL CORPORATION OCKET PLANT N OPERATIONAL E TRANSDUCER		Pa	LIBRATION ge 1 of 5
MFG.		OUTPUT)		703	-		00 nsia
MODEL	P4331.	TC-750	CALTERATED E	Dept. 8772	DATE	3-15-	-63
ROOM TEMP		75	ASS TOWN	TO ENGINE NO	ЦЦ FW	1 -88	
				PARAME			ter Pressure
x	ACCEPT (NOTE			CHECKED BY_	Dept.	. 8772	
REMARKS		De due to si	HIPPING, HANDLIN	IG, PACKAGING, ETC	•		
		SULATION RESISTANCE		III. CI	CUIT ISOL		TOLERANCE
CAS	E & PINS	IN MEGOHMS	TOLERANCE	PINS	IN ME	CORMS	1 Megohm
_	A	10,000M		A-D & I	3-C 10,00	MOO	Minimum
	В	10,000 ^{Ni}		X ACC	EPT		
ļ	Ç	17,000M	l Magohm Minimum	المسا			
	_ п	10,000M					
-	E	10,000M					
	F	10,000M					
X	ACCEPT						

IV. PRIMARY POWER CURRENT

READI MILLI	 TOL	eran	CE	EXCITATI VOLTAG	 TOLERANCE
<u>l</u> ;2	70	na m	ax.	28	28±0,2VDC

Page 2 of 5

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY

(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 3-15-63
S/N 703

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

BEFORE O	FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		BSURE D PSIA	FOR REFERENCE ONLY AFTER OVERPRESSURE PS 10 READINGS		
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUT PUT IN VOITS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	
72.4	5.069	6.672	7.50V MAXIMUM	68.Ц	5.065	

X ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
10	25 MV MAXIMUM

ST 3083A

DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

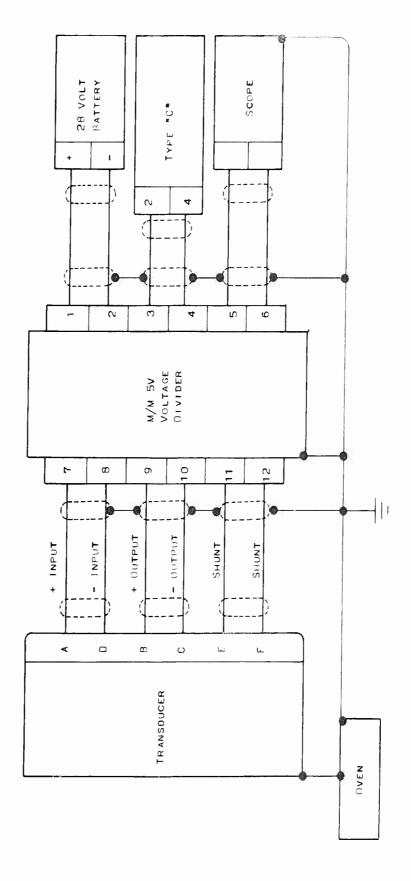
Page 3 of 5 3-15-63 DATE 703 3/<u>N</u>

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 1 5 F (NOTES 1 & 2)

0 1999 4010	1995	X 1940 2060	TOLERANCE	TOLERANCE	VOLTAGE	VOLTAGE TOLERANCE	
1999 4010		1940 2060					
4010		2060					
·	11776		40 Unit Variation				
/037	<u> </u>	3940 11060				40 Unit	28
6017	6113	5940 6060			_		
8020	າ16	7940 8060					
10,000	9997	I					
0		I		Mart min	28	28 [±] 0.2 VDC	
1999	1995	1 <i>9</i> 40 2060					
4 11	L 107	3940 4060	lin Matt	Deviation From			
5015	6013	59110 6060	Variation	Average of			
5017	⁸ 216	7940 8050		Cycles 20 Units			
4997	9997	I					
0		I					
1999	1993	1940 2060					
นวาว	1005		40 Unit				
6015	6711	5940 6060	Variation		28		
°017	⁹ 013	7940 8060					
9097	9994	x					
LINEARITY			BTERES IS	(LITY	
	10,000 1999 4 10 5015 5017 9997 0 1999 4010 6015 9017 9997 LINEARITY	10,000 0997 1999 1995 4 10 4007 5015 6013 5017 8016 9997 9997 0 1999 1993 4010 4005 6015 6011 9017 9013 9097 9994 LINEARITY	10,000 5697 X 1999 1995 1940 2060 410 4060 5015 6013 6060 5017 8016 8060 5097 X 1999 1993 1940 2060 4010 4006 6015 6011 6060 6015 6011 6060 6015 6011 8060 9097 9097 X LINEARITY B. HY	10,000 5697 X 1 1999 1995 1940 2060 410 Unit Variation 5015 6013 5940 4060 40997 9997 X 1 1999 1993 1940 2060 4011 Variation 5015 6011 5940 4050 400 400 400 400 400 400 400 400	10,000 3097 X	10,000 3697 X	

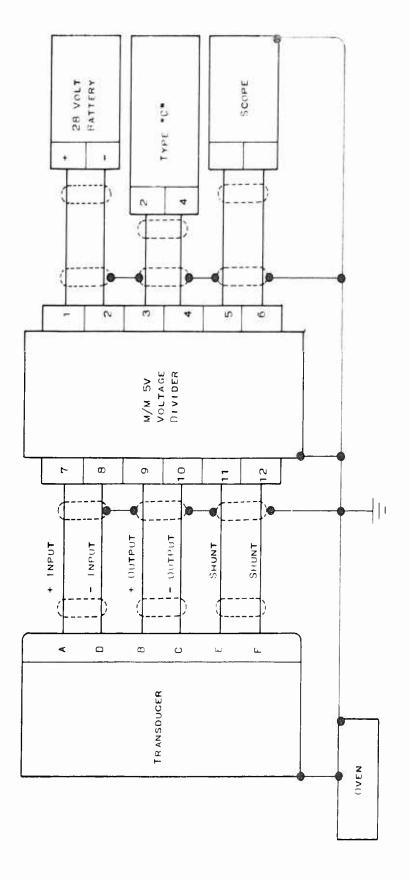
7	MII.	SHUNT	CALIBRATION	(NOTE 3)		
	% FULL	OF SCALE	75 2 5°F	SHUNT TOLERANCE	BXC TT AT ION VOLT AGE	TOL
		75	7505	7,475 7,525	28	28±0.2 VDC

ACCEPT



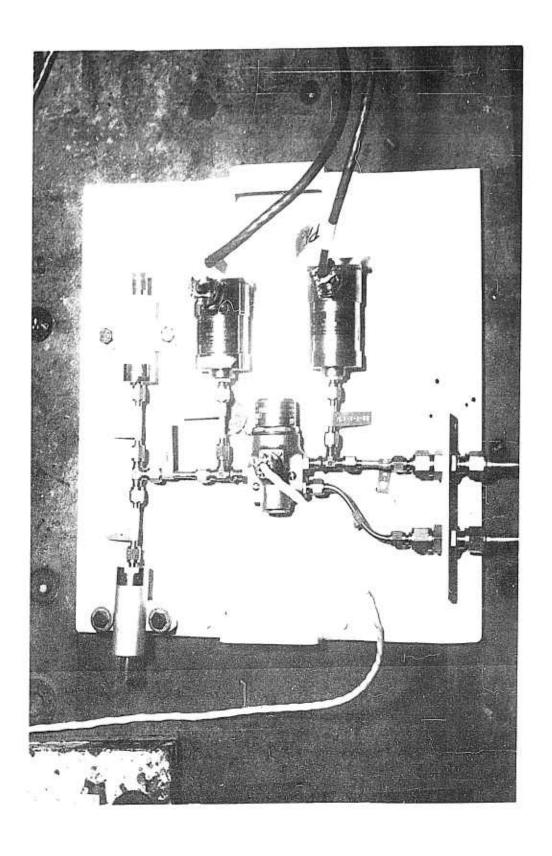
Posttest Calibration, Transduce: SN 703 (Motor 44FW-88)

Figure 21



Posttest Calibration, Transducer SN 703 (Motor 44FW-88)

Figure 21



Posttest Calibration, Transducer SN 703 (Motor $44 \mathrm{FW-88}$) Figure 21

70.400	3083A E: 9-17-6 3E: 2500 (57	2 PSIA ONLY OUTPUT)		ABROJET -GENE 80LID ROC MINUTEMAN PRESSURE	A POST DY LY	t nal er	P.O.#_		age 1 of 5
	Stathar	n			77		E TEST CAI		
				SERIAL NO					
MODEL	PA330110			CALIERATED BT	Dept	. 8772	DATE	12-1	1-52
ROOM TEM	P	⁷⁶	F	assigned 1	TO ENGINE	NO	1,4 Fd-7	5	
BAROMETR	IC PRESSUR	E	757.4	MM HO		PARAME	TER MEASU	ED_IP	miter pressure
					CHEC	KED BY	Ken B	ushey	
[X ACCEP				ASSIG	NED BY_	Men B	8772 Leeds	
ĬĬ	. CASE IN		···		į		ecuit isol		
Į	BETWEEN ASE & PINS	RESISTANC IN MEGORIM	E T	OLERANCE		BETWE! PINS		TANCE COHMS	TOLERANCE
	A	17,700				A-D & E	3-C 17,1	Jori	l Megohm Minimum
	В	17,770M			1	 د. الآ			
	С	17,700M		1 Megohm	{	X ACC	EPT		
	<u>n</u>	10,000M		Minimum					
	B	10,3000							
	F	10,700%							
X	ACCEPT								

IV. PRIMARI POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
41	70 MA Max.	28	28±0.2VDC

Page 2 of 5

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT) ABROJET-JEMERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 12-12-62 S/N 477

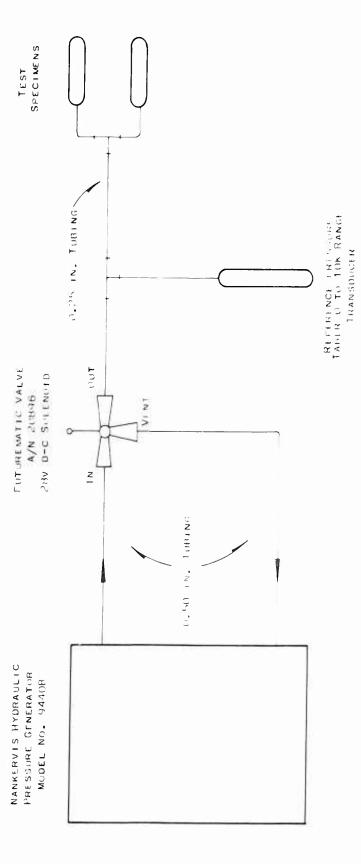
V. 150% OVERPRESSURE AND LIMITING VOLTAGE

BEFORE O	FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		BSURE O PSIA	FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS		
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLIS	FULL SCALE OUT PUT IN VOLTS	
35.9	5.037	6.736	7.50V MAXIMUM	49.6	5.056	

X ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
15m v	25 HV MAXIMUM



Prefest Calibration, Transducer SN 477 (Motor 44FW-75)

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-OETERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

Page 4 of 5

DATE 3-15-63 S/N 703

IX. LINEARITY, HISTERESIS, 6 30 \$ 5°F (HOTES 1 & 2)

PRESSURE	OUTPUT :	ETINU NI	LINEARITY	HISTERESIS	RECORD EXCITATION	ANCIL TO H
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	volfage"	TOLERANCE
0	2		x			28 ±0.2 VDC
500	1999	1996	1940 2060			
1000	4010	L010	3940 4060	40 Unit		
1500	6017	6019	5940 6060	Variation	25	
2000	8014	8019	794.0			
2500	10,000	10000	I			

I ACCEPT

I. LINEARITY, HYSTERESIS, @ 150 1 5°F (NOTES 1 & 2)

PRESSURE	OUTPUT	IN UNITS	LINEARITY	HYSTERESIS	RECORD EXCITATION	KICITATION
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	BOATION	VOLTAGE TOLERANCE
0	-2		X			
500	1993	1990	1 <i>9</i> 40 2060			
1000	4003	3997	3 <i>9</i> 40 4060	40 Unit		28 ± 0.2
1500	6209	6000	5940 6060	Variation	28	VDC V
2000	8015	8005	7940 8360			
2500	10,000	9990	I			

I ACCEPT

II. ZERO OUTPUT (ROTES 4 & 5)

AL, ZEKU	OUTPUT (AUI	क्षा ५ % जू <i>।</i>					
FUNCTION	00TP07 @ 7525°F	EXCITATION VOLTAGE	CUTPUT @ 3025°F	EXCITATION VOLTAGE	our Pur 6 150±5°F	VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUT PUT IN MILLIVOLT	A +L1.5	28	+21.9	2°	-30.0	25	
ZERO OUT PUT TOLERANCE	-h +102mv	I	A255 ST	I	A±85 mv	X	28 ± 0.2 VDC

X ACCEPT

Pretest Calibration, Transducer SN 477 (Motor 44FW-75)

MEROJET-OEMERAL CORPORATION SOLID ROCKET PLANT Page 5 of 5

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLI

MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

III. PULL	5V OUTPUT)	ot (note 6)		S/R				
FUNCT ION	001 PU1 0 75-5°F	EXCITATION VOLTAGE	007707 • 3025°F	EXCITATION VOLTAGE	007.PUT 015025°F	VOLTAGE VOLTAGE	VOLTATION VOLTAGE TOLERANCE	
P.S.OUT- PUT (PSIG) IN VOLTS	5.063	۶۶	5.049	27	5.135	5=		
ZKBO OUT - POT (PSIA) TW VOLES	.11691	25	.0.7.	?=	.1583) -	28 - 0.2	
CORRECTED F.S.OUTPUT IN VOLTS	A 4.9939	25	112295	81	4767	27	VDC	
P S.OUT PUT COLUMN A TOL.	5 ± 0.1 ¥	x	A ± .0557	I	1 2 .0857	I		

X ACCEPT

GENERAL NOTES:

- a. All readings shall be taken at 75 15°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 10.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. I = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- These calibration data sheets shall be used with the latest revision of Asrojet Galibration Procedure ACP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

- 1. Balance transducer output to sero at atmospheric pressure, apply 2500 psig pressure and range type *C* calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to sero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer zero output (test II) shall be recorded at 5.0 mm Hg or less.
- 5. Negative voltage reading shall not be accepted at 75 ± 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column & as full scale output at each temperature point.

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (57 OUTPUT)				MERAL CORPORAT MOCKET PLANT IN OPERATIONAL ME TRANSDUCER		P.O.#		Page 1 of 5	
FO.	Statram		SERIAL NO						
			CALIERATED E						
			ass ioned						
AROMETRIC	PRESSURE _	75	1.0 мм но	?	aranet er	MEAS TRE	m [7	iter Press	
				CHECKED ASSIGNED	37	i.ec. E	usrey		
X	ACCEPTED (NOTE g)			ASSIGNED	BY F	Dept.	8772 eds		
NO VISI REMARKS	INS PECT ION BLE DAMAGE	•	HIPPING, HANDLI	NG, PACKAGING	 , <i>s</i> rc.				
NO VISI REMARKS	BLE DAMAGE ACCEPT CASE INSU	DUE TO S	HIPPING, HANDLI	III.	. ci⊇ot				
NO VISI REMARKS	BLE DAMAGE	LATION	HIPPING, HANDLE	III.	0120U	RES IST	ANCE	TOLERANCE	
NO VISI REMARKS	BLE DAMAGE ACCEPT CASE INSU ETWEEN RE E & PINS IN	LATION		III.	0120U	RESIST IN MED	ANCE ORMS	TOLERANC:	
NO VISI REMARKS	BLE DAMAGE ACCEPT CASE INSU ETWEEN RE E & PINS IN	LATION SISTANCE MEGOHMS		III.	CIROTAREN PINS D 4 B-C	RESIST IN MEDI	ANCE ORMS	1 Megohm	
NO VISI REMARKS	BLE DAMAGE ACCEPT CASE INSU ETWEEN RE & PINS IN A B	LATION SISTANCE MEGOHMS 10,000M	TOLERANCE	III.	CIRCU RETARN PENS	RESIST IN MEDI	ANCE ORMS	1 Megohm	
NO VISI REMARKS	BLE DAMAGE ACCEPT CASE INSU ETWEEN RE E & PINS IN A B C	LATION SISTANCE MEGOHES 10,000M	TOLERANCE	III.	CIROTAREN PINS D 4 B-C	RESIST IN MEDI	ANCE ORMS	1 Megohm	
NO VISI REMARKS	BLE DAMAGE ACCEPT CASE INSU ETWEEN RE E & PINS IN A B C	TATION SISTANCE MECOHES 10,00M 10,00M	TOLERANCE	III.	CIROTAREN PINS D 4 B-C	RESIST IN MEDI	ANCE ORMS	1 Megohm	

IV. PRIMARI POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
41.5	70 MA Max.	2 =	28±0,2VDC

Page 2 of 5

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 1-16-63

S/N ______

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

BEFORE O	FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		BSURE D PS LA		ENCE ONLY RPRESSURE ADINGS
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUT FUT IN VOLTS	FULL SCALE OUT PUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	PULL SCALE OUTPUT IN VOLTS
62.7	5.067	6.77ц	7.50V MAXIMUM	60.5	5.070

X ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLEPANCE
15 m v	25 MV MAXIMUM

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER Page 3 of 5
DATE 12-12-62

77

ACCEPT

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 2 5°F (NOTES 1 2 2)

PRESSURE		PHITS	LINEARITY	HYSTERESIS	REPEAT -	EXCITATION	ZICH AT IOI
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	POLE ANCE	VOLTAGE	TOLERANCE
0	2522	25/20	<u> </u>				
500	2771	200E	1940 2060				
1000	4705	3975	3940 4060	40 Unit		257	
1500	6993	5975	5940 6060	Variation			
2000	8226	7990	7940				
2500	10,000	10000	I				
0	2000	2500	I				28 ± 0.2 70c
500	2003	2008	1940 2060		Maximum	!	
1000	4005	3978	3940 4060	40 Unit	Deviation From		
1500	6901	59 ⁸ 3	5940	Variation	Average of Three	257	
2000	8005	7992	6060 7940 8060		Cycles		
2500	10000	120207	I		20 Units		
0	0000	2270	I				
500	2004	2009	1940 2060				
1000	4208	3973	3940 4060	40 Unit		25#	
1500	6005	5980	5940 6060	Variation		287	
2000	8008	7988	7940 8060				
2500	10000	10000	x				

7	TII.	SHUNT	CALIBRATION	(NOTE 3)		
	~	OF SCALE	75±5°F	Shunt Tolerance	EXCITATION VOLTAGE	TOL
		75	7510	7,475 7,525	28	28±9.2 700.2

ACCEPT

X ACCEPT

ACCEPT

ST 3083A

DATE: 9-17-62 RANGE: 2500 PSIA OHLY (5V OUTPUT) AEROJET-GEMERAL CORPORATION SOLID ROCKET PLANT

SOLID POCKET PLANT MIDHUTEMAN OPERATIONAL PRESSURE TRANSDUCER Page 4 of 5

12-12-52

5/N ______

DATE

X. LINEARITY, HYSTERESIS, @ 30 2 5°F (NOTES 1 4 2)

PRESSURE	OUTPUT	IN UNITS	LINEARITY	HETERESIS	RECORD EXCITATION	EXCITATION TOLERANCE
(PSIG)	DECREASING	INCREAS ING	TOLERANCE	TOLERANCE	TOLTAGE"	TOLERANCE
0	•1		ı			
500	5. 4.	1975	1940 2060			
1000	1.71	3972	3940 4060	40 Unit	25	28 10.2
1500	6000	5973	1,060 5,94,0 6060	Variation	25	VDC
2000	4003	7986	7940			
2500	10,000	10000	I			

X ACCEPT

I. LINEARITY, HYSTERESIS, 0 150 2 5°F (MOTES 1 4 2)

PRESSURE	OUTPUT	IN UNITS	LINEARITY	HYSTERES IS	RECORD EXCITATION	ECCULATION
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	POLTAGE	VOLTAGE TOLERANCE
0	-1		ı			
500	1993	1973	1940 2060			
1000	3998	3970	3 <i>9</i> 40 4060	40 Unit	25	28 ± 0.2
1500	5000	5973	6000 5910	Variation	٤,	₩DC
2000	8,500	7955	7 <i>9</i> 40 8060			
2500	10,000	9 909	I			

X ACCEPT

II. ZERO OUTPUT (NOTES 4 4 5)

FUNCTION	00TPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT e 3025°P	EXCITATION VOLTAGE	0th Put e 150±5°F	FEXCITATION VOLTAGE	VOLTAGE TOLERANCE
ZERO OUI PUI IN MILLIVOLI	A 21.2	28	+2=.9	25	-30.8	28	
ZERO OUT PUT TOLERANCE	-D +102mv	I	A255 W	I	A±85 mv	I	28 ± 0.2 VDC

KINOJET-GENERAL CORPORATION Page 5 of 5 SOLID ROCKET PLANT 12-12-52 MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER RANGE: 2500 PSIA ONLI _77 3/M

(5V OUTPUT) FULL SCALE OUTPOR (NOTE 6) 001 P01 e 75-5°P EXCITATION VOLTADE EXCITATION OUTPUT OUT PUT EXCIPATION NOI TOKUT VOLTAGE # 3025 T POLTAGE \$15025°P VOLTAGE TOLERANCE 5.053 5.047 5.031 25 ZABO OVI I 28 23 .0491 28 .7542 .. 5242 28 ± 0.2 CORRECTED S.S.OUTPUT 7DC 5.0039 28 28 5.527 28 4.993 DI VOLTS 5 ± 0.1 ¥ A 2 .0557 I ▲ 1 .085¥ I I

I ACCEPT

ST 3083A

DATE: 9-17-62

GENERAL HOTES:

- a. All readings shall be taken at 75 15 T unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c. 10,000 units shall squal 100% full scale transducer reading.
- d. X = not applicable.
- e. A 5-minute warmen time is required for each transducer.
- f. These calibration data sheets shall be used with the latest revision of Asrojet Calibration Procedure ACP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepent transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST HOTES:

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 peig pressure and range type "C" calibrator for 10,000 units on first cycle only.
- 2. Linearity telerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to zero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer zero output (test II) shall be recorded at 5.0 mm Hg or less.
- 5. Negative voltage reading shall not be accepted at 75 ± 5°P.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 paig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 peig and record the difference in column A as full scale output at each temperature point.

ST 3083A DATE: 9-17-62 PANGE: 2500 PSIA (57 OUTPU	CYLY	8011D ROO HINTEMAN	LAL CORPORATION DEST PLANT OPERATIONAL TRANSDYCER		Page 1 of 5
MPOtatram		SERIAL NO.	119	RANGE 251	C bela
MODEL PASSIN			Dept. 8772	יייייייייייייייייייייייייייייייייייייי	-31-63
ROOM TEMP.	• p	ים מבונסת במים במים.	מע פינדטער		
BAROMETRIC PRESSURE					Igniter Pressure
					·
			CHECKED BY_	Yer Blarey	**
X ACCEPTED (NOTE g)			ASSIGNED BY_	P. A. Leeds	/2
(
NO VISIBLE DAMAGE D' REMARKS X ACCEPT II. CASE INSULATE BETWEEN RESTS	NCI.			ent isolatio	-
CASE & PINS IN HE		TOLERANCE	PINS	DI PERMI	45 .OE.OC.105
A 10,	NO DM		A-D 4	B-C 10,000M	l Megohm Minimum
В 12,	100v		X AC	^ 7 2 7 7	
o 1°,	nox	1 Megoha Minimum	<u>^</u>		
n 10,	r ngv	- STIT LUCIA			
B 10,	300X				
F 10,	nory				
X ACCEPT	IV. PR		PYCTELETON	TOLERANCE	

Pretest Calibration, Transducer SN 493 (Motor 44FW-94)

70 MA Max.

X ACCEPT

28±0,2VDC

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ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 1-31-63
S/N 493

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

for reference only before overpressure ps to readings		ORE OVERPRESSURE 3750 10 PS IA		FOR RZFERENCE ONLY AFTER OVERPRESSURE PS IO READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	ו שיתות פייוד הייי ו או יוזו או ווווא מיווו		ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUT PUT IN VOLIS
~3. 9	5.062	6.783	7.50V HAXIMUM	ec.3	5.76L

X ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PRAK TO PEAK) READING @ F.S.	TOLERANCE
14	25 HV MAXIMUM

ST 3083A

DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)

AZROJET-OZNERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSCUCER

Page 3 of 5 T-31**-**53 DATE 3 <u>/∖</u>

VII. LINEARITY, HYSTERESIS, REPEATABILITY 9 75 2 5°F (NOTES 1 4 2)

DECREASING	INCREASING	TOLERANCE		ADAMAAA	MOTO LOD	701703		
ĵ.			TOLERANCE	ABILETYCE	70LTAGE_	TOLERANCE		
1		I		İ				
20.5	3.7.	1340 2060						
.127	14	3940	40 Unit		2=			
: 35	-195		Variation		-			
F135	2-20	7940 3060]					
10,000	1976	I						
3		ĭ						
2709	2112	1940 2060		Mariem	1			
25		3940	Devi	Deviation it From Average of	Deviation		28 1 0,2	
u03u	:125	5940	Variation		25	7DC		
+^33	= - 27	7940	Cycles					
9995	2225	I		20 Tmits				
•		I						
2104	3 772	1940 2060						
_^2=	-17	3940	40 Jnit		22			
613.	5727	5940 6060	7ariation		-			
+032	Fn26	7 <i>9</i> 40 8060						
2225	2005	I						
	0135 10,000 0 2109 0135 1133 0005 1 2104 0125 0134 1132	10,000 1996 10,000 1996 2109 2102 1120 1117 1030 1124 1133 1127 1045 1045 2104 2117 1134 1147 1135 1147 1148 1147 1158 1158 1158 1158 1158 1158 1158 1158	190 194 3940 1960 19	190 191 1940 190	130 131 3940 40 Unit Variation 135 132 1340 10,000 1445 X 2060	180 181 184		

X ACCEPT

X ACCEPT

I ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

≸ OF FULL SCALE	75 2 5°F	SHUMT TOLEPANCE	BXCITATION VOLTAGE	TOL
75	7_97	7,475 7,525	2 5	2 <u>8</u> ±0.2

ACCEPT

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

Page 4 of 5

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LINEARITY, HYSTERESIS, @ 30 \$ 5°F (NOTES 1 & 2)

PRESSURE	OUTPUT :	OUTPUT IN UNITS		HYSTERESIS	RECORD EXCITATION	STC IT AT ION	
(PSIG)	DECREASING	INCREAS ING	TOLERANCE	TOLERANCE	VOLTAGE"	TOLERANCE	
0	5		ı				
500	27	1997	1940 2060	40 Unit	5°		
1000	.,727	anja	3940 4060			28 ±0.2 700	
1500	6039	60.13	4060 5940 6060	Variation			
2000	¥034	2 2	7940				
2500	10,000	9994	I				

ACCEPT

I. LINEARITY, HYSTERESIS, @ 150 1 5°F (NOTES 1 4 2)

PRESSURE	OUTPUT IN UNITS		LINEARITY	HYSTERESIS	RECORD EXCITATION	EXCITATION
(ESIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	FOLTAGE	VOLTAGE TOLERANCE
0)		I	1 1940 2060		
500	2005	1997	1940 2060		2:5	
1000	u019	7,10	3 <i>9</i> 40 4060	40 Unit		ADC 58 7 0.5
1500	6030	6120	5940 6 06 0	Variation		
2000	ฮา33	5125	7 <i>9</i> 40 8060			
2500	10,000	9998	I			

ACCEPT

MI. ZERO OUTPUT (NOTES h & 5)

FUNCTION	00TP0T @ 75±5°F	EXCITATION VOLTAGE	001P01 0 30±5°F	EXCITATION VOLTAGE	0का PVI 0 150±5 °F	VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUI PUI IN MILLIVOLI	A La,a	2 [¢]	57,9	2°	29,2	2 =	
ZERO OUT PUT TOLERANCE	-0 +102mv	I	A255 HV	I	A±85 av	I	28 ± 0.2 7DC

ALROJET -GENERAL CORPORATION

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ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLI

(SV OFFPIRE)

SOLID ROCKET PLANT MINUTENAN OPERATIONAL PRESSURE TRANSDUCER

DATE

S/M

XII. PULL	SCALE OFFE	OT (NOTE 6)					
FUNCTION	001 PUT 0 75-5°F	EXCITATION FOLTAGE	OUTPUT 30 ² 5°F	EXCITATION FOLTAGE	007.PUT 015025°F	EXCITATION VOLTAGE	VOLTAGE TOLERANCE
P.S.OUT- PUT (PSIO) IN VOLIS	30.1FF	,	1	5-	1,154.1	54	
ZKBO OUT - PUT (PSIA) TN VOLTS	7-3			,"	. 7.	54	28 ± 0.2
CORRECTED F.S.OUTPUT IN VOLTS	A ²⁷ *,7	24	7 27	5 ·	•	5 F	7DC
P SOUTPUT COLUMN A TOL	5 ± 0.1 V	x	A 2 .0557	I	1 : .0857	I	

X ACCEPT

GENERAL NOTES:

- a. All readings shall be taken at 75 15°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. X = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- These calibration data sheets shall be used with the latest revision of Asrojet Calibration Procedure ACP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 paig pressure and range type $^{\rm BCR}$ calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to zero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer sero output (test XI) shall be recorded at 5.0 mm Hg or less.
- 5. Negative voltage reading shall not be accepted at 75 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

ST 3083A DATE: 9-17-6 PANGE: 2500 (57)	2 PSIA ONLY OUTPUT)	KEROJEI -OZK 80LID R MIN J. EMA PRZESJR	eral cor <i>p</i> oration OCKET PLANT N OPERATIONAL E TRANSDUCER			uge 1 of 5
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,			 SBLLAC IDST-		· · · · · · · · · · · · · · · · · · ·
MPO. Statham		SERIAL NO	11.93	RANGE	1-2	
MODEL PASSATO	····	CALIERATED B	TDept. 8772	DATE _	3-7-	-69
ROOM TEMP.		ass ionzd	TO ENGINE NO	Ti-3		
BAROMETRIC PRESSURI	755.	2 MM HO	PARA			. <i>En-</i> 24
X ACCEPT (NOTE			CHECKED BY	Yen Bush Dept. P. b. Leed	ey 8772 s	
NO VISIBLE DAMA REMARKS	LOE DIE TO SE	HIPPING, HANDLE	NG, PACKAGING, ET			
II. CASE IN				IXMI ISOL		
BETWEEN CASE & PINS	RESISTANCE IN MECONES	TOLERANCE	BET?	RESIST S IN MON	ANCE	TOLERANCE
	10,000%		A-D 4	B-C 17,77	74.	l Megohm Minimum
В	10,100%		[\forall]			
С	10,000M	1 Megohm	X A	OCZPI		
	10,000%	Minimum				
E	10,000%					
7						
X ACCEPT						

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
41	70 MA Max	28	2820,2770

Page 2 of 5

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT) AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 3-7-63

S/N 493

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		EFORE OVERPRESSURE 3750 ±10 PS IA			ENCE ONLY RPRESSURE ADINGS
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	OUTPUT IN ETOURNANCE L		ZERO OUTPUT IN MILLIVOLIS	FULL SCALE OUT PUT IN VOLTS
85.3	5.064	6.795	7.50V MAXIMUM	81.3	5.06և

X ACCEPT

VI. RESIDUAL NOISE

	
MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
12	25 MV MAXIMUM

ST 3083A

DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)

AZROJET-GENERAL CORPORATION

SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

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DATE 3-7-63

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VII. LINEARITY, HYSTERESIS, REPEATABILITY 9 75 2 5°F (NOTES 1 4 2)

PRESS URE	OUTPUT IN UNITS		LINEARITY	HYSTERESIS	REPRAT-	EXCITATION	EXCITATION	
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	TOLERANCE	VOLTAGE	TOLERANCE	
0)		Х					
500	2109	2002	1.940 2060	µO Unit Variation	40 Unit 25			
1000	4028	4019	3940 4060					
1500	6040	6031	5940 5940				28 ÷ 0.2 VDC	
2000	H038	8033	7940 2060					
2500	10,000	10000	I					
0)		x			28		
500	2008	2102	1940 2060	40 Unit From Variation Average of	Maximum			
1000	14027	211 <u>6</u>	3940 4060		Deviation			
1500	603ª	5030	5940 6060					
2000	P036	£030	7940 8060					
2500	10000	10000	X					
0	0		x					
500	2009	2001	1940 2060					
1000	L027	101°	3940 4060	40 Unit		28		
1500	573 ⁸	5029	5940 6060	Variation		45		
2000	t035	9029	7940 8060					
2500	10000	1097	I					
A	. LINEARITY		B. HYS	TRESIS		. REPEATABI	LITY	

VIII. SHUNT CALIERATION (NOTE 3)

,	TIII. SHORT	ONDITION TON	(3013)/		
	% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
	75	7570	7,475	29	28±0.2 700

ACCEPT X

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLI (5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER Page 4 of 5 3-7-63

DATE

x. Linearity, hysteresis, • 30 * 5°F (notes 1 & 2)

PRESSURE	RE OUTPUT IN UNITS LINEARITY		HISTERESIS	RECORD EXCITATION	TON EXCITATION		
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	"VOLTAGE"	TOLERANCE	
0	0		ı	}		28 ±0.2 VDC	
500	2002	1995	1940 2060]	28		
1000	4025	7019	3940 4060	40 Unit			
1500	6038	6033	5940 6060	Variation			
2000	8033	8030	7940 6660				
2500	10,000	9998	I				

X ACCEPT

I. LINEARITY, HYSTERESIS, @ 150 15°F (NOTES 1 & 2)

PRESSURE	OUTPUT IN UNITS		LINEARITY	HYSTERESIS	RECORD EXCITATION	EXCITATION	
(B210)	DECREASING	SCREASING INCREASING TOLERANCE TOLERA		TOLERANCE	VOLTAGE	VOLTAGE TOLERANCE	
0	0		r		28		
500	2005	1999	1940 2060				
1000	<u> 1</u> 020	4012	3 <i>9</i> 40 4060	40 Unit		28	28 ± 0.2
1500	6030	6022	5940	Variation		▼DC	
2000	8034	8030	7 <i>9</i> 40 8060				
2500	10,000	10000	I				

X ACCEPT

LI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT 9 7525°F	EXCITATION VOLTAGE	OUTPUT e 3025°F	EXCITATION VOLTAGE	0सा हजा । 150±5 °T		EXCITATION VOLFACE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A 51.2	28	66.3	28	30.1	28	
ZERO OUT PUT TOLERANCE	-b +102mv	I	A255 my	I	A±85 mv	X	28 ± 0.2 VDC

MEROJET-GENERAL CORPORATION SOLID ROCKET PLANT Page 5 of 5

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

MINUTENAN OPERATIONAL PRESSURE TRANSDUCER DATE 3-7-63
S/N 493

FUNCTION	OUT PUT	EXCITATION VOLTAGE	OUTPUT • 30±5°F	EXCITATION VOLTAGE	007 PUT @15025 °F	VOLTAGE VOLTAGE	VOLTAGE TOLERANCE
PUT (PSIG) IN VOLTS	5.160	25	5.0850	? [#]	5.0300	28	
ZERO OVI DI VOLLE	.0453	25	. 99 u ^a	28	.5582	28	28 2 0.2
CORRECTED F.S.OUTPUT IN VOLTS	k 4.9797	25	9+92	28	4.9718	28	VDC
P SOUTPUT COLUMN A TOL.	5 ± 0.1 ¥	x	1 2 .0557	I	£ ± .0857	I	

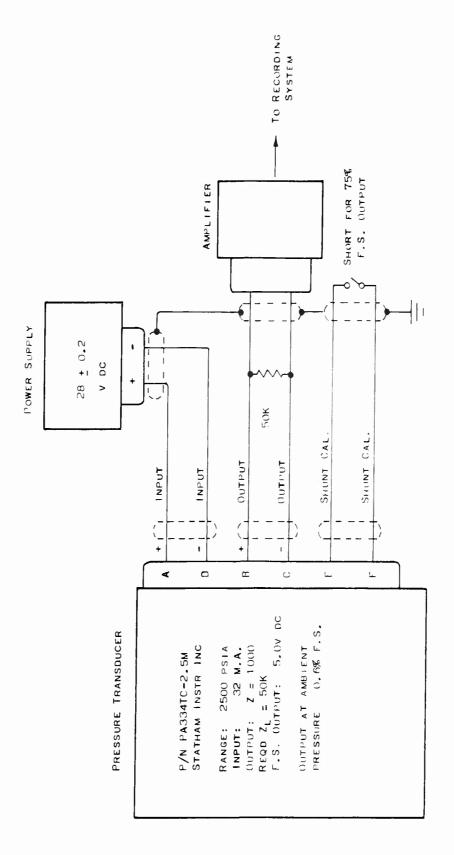
X ACCEPT

GENERAL MOTES:

- a. All readings shall be taken at 75 1 5°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. I = not applicable.
- e. A 5-minute warmap time is required for each transducer.
- These calibration data sheets shall be used with the latest revision of Asrojet Calibration Procedure ACP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or angineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

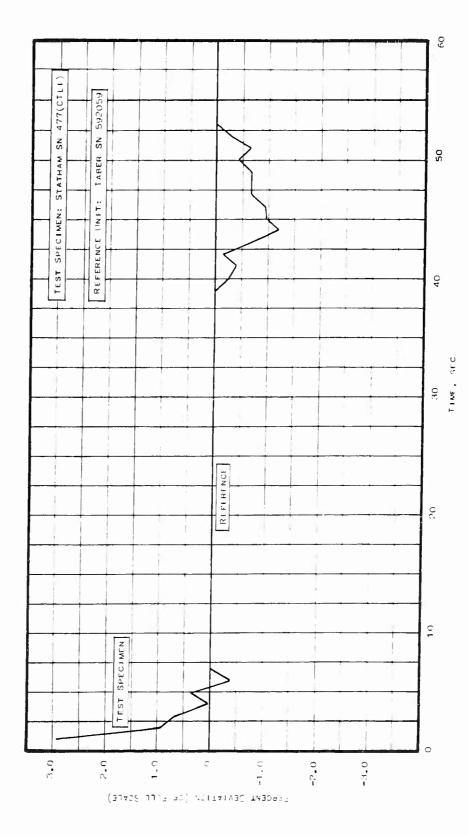
SPECIFIC TEST MOTES:

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 paig pressure and range type *C* calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer extput to sero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer zero output (test II) shall be recorded at 5.0 mm Mg or less.
- 5. Negative voltage reading shall not be accepted at 75 = 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

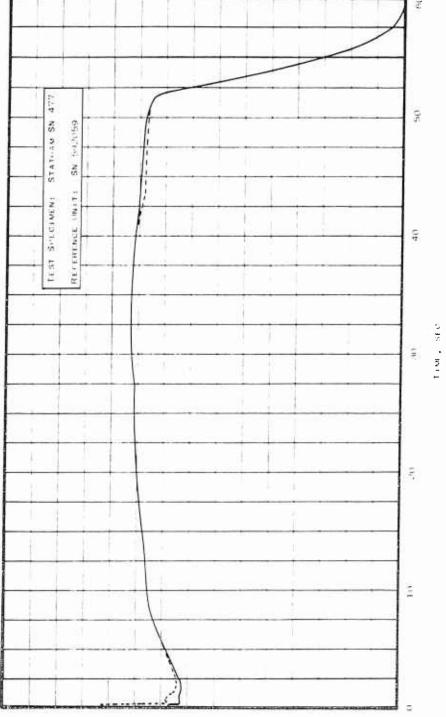


Wiring Diagram for Motor Static Tests

View of Transducer Installed on Static Test Motor

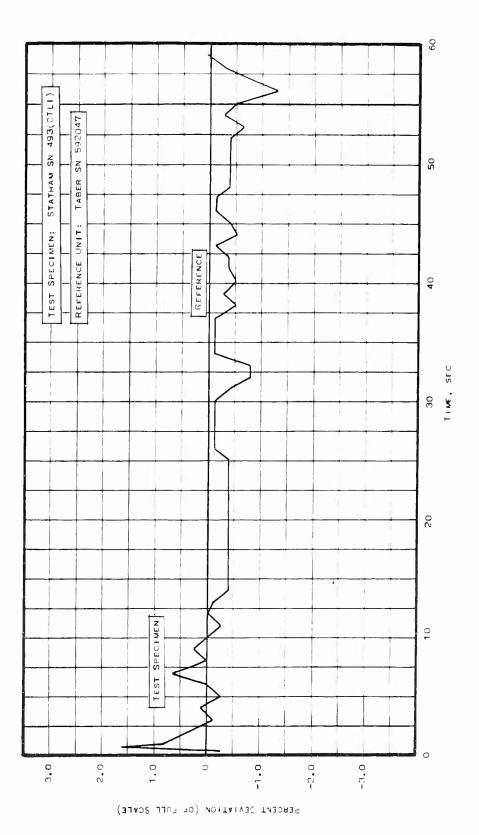


Percent Deviation-vs-Time, Transducer SN 477



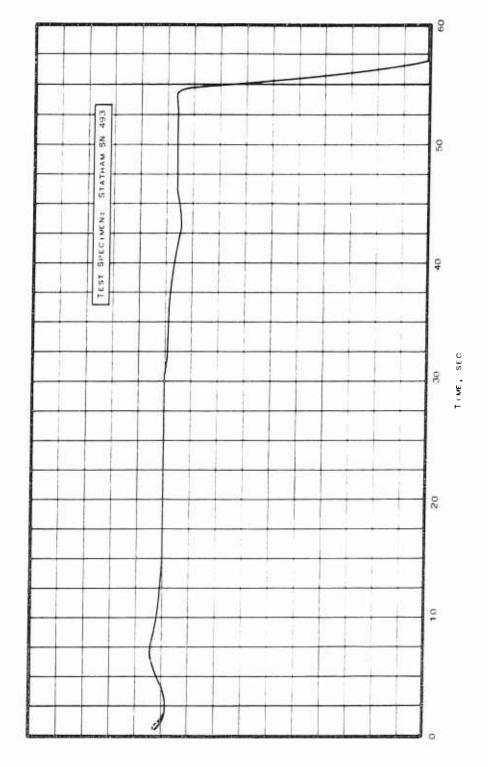
Pressure Amplitude-vs-Time, Transducer SN 477

300±17am∀ 3e0SSaba

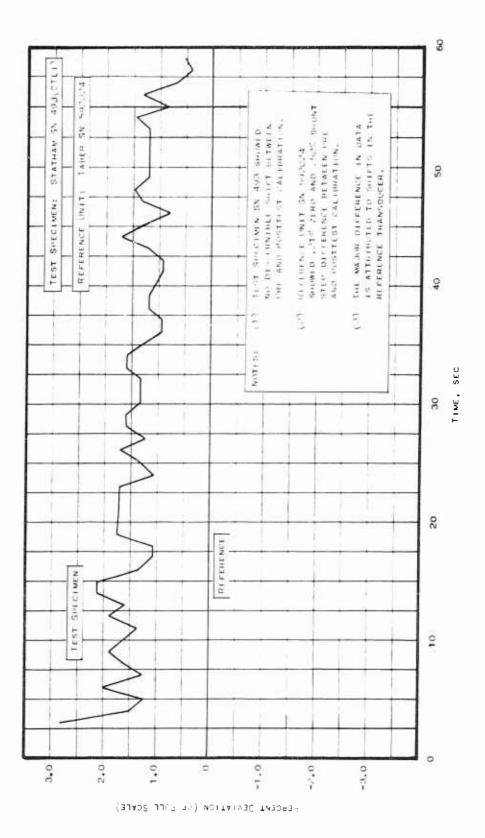


Percent Deviation-vs-Time, Transducer SN 493

Figure 30

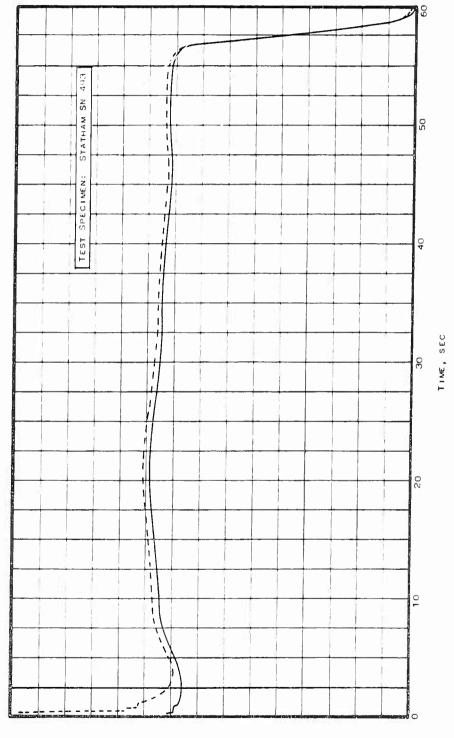


BRESSURE AMPLITUDE



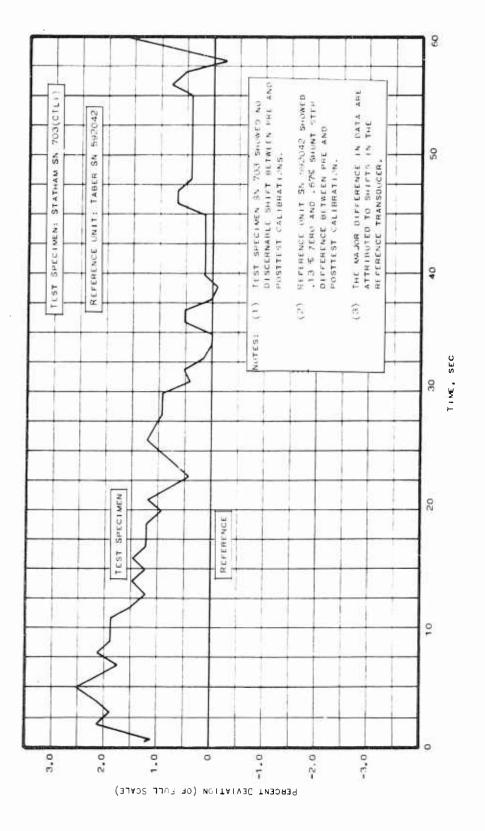
Percent Deviation-vs-Time, Transducer SN 493

Figure 32



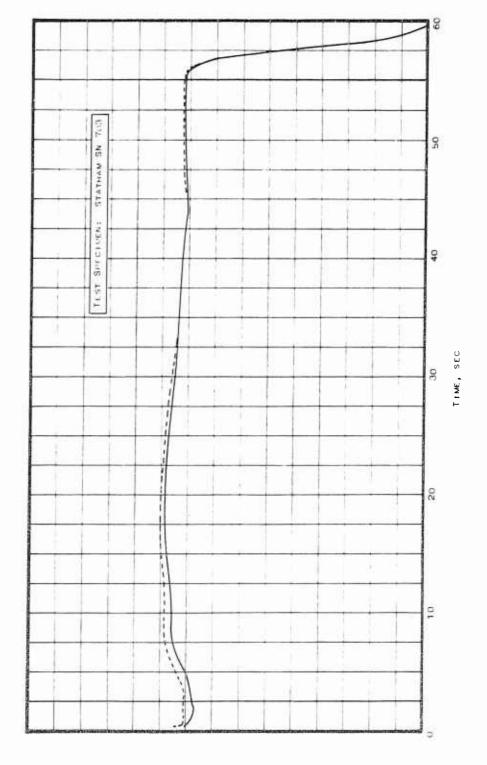
Pressure Amplitude-vs-Time, Transducer SN 493

CHAMBER CRESSURE



Percent Deviation-vs-Time, Transducer SN 703

Figure 34



SAUSSER "RESSURE

Figure 35

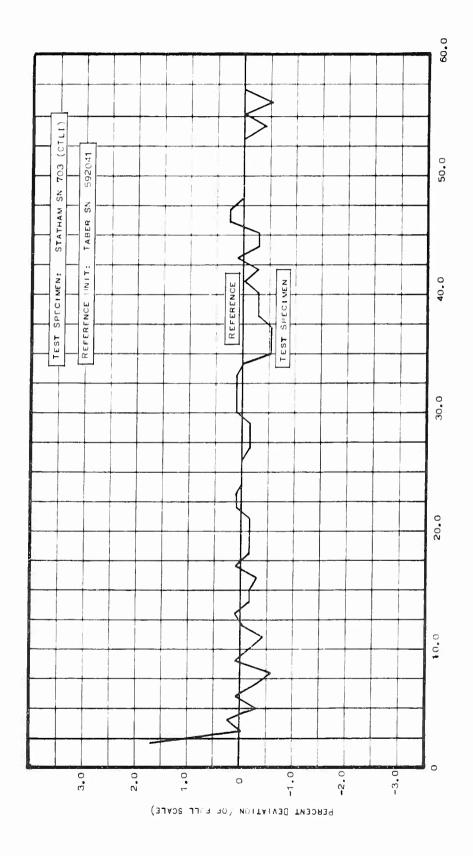
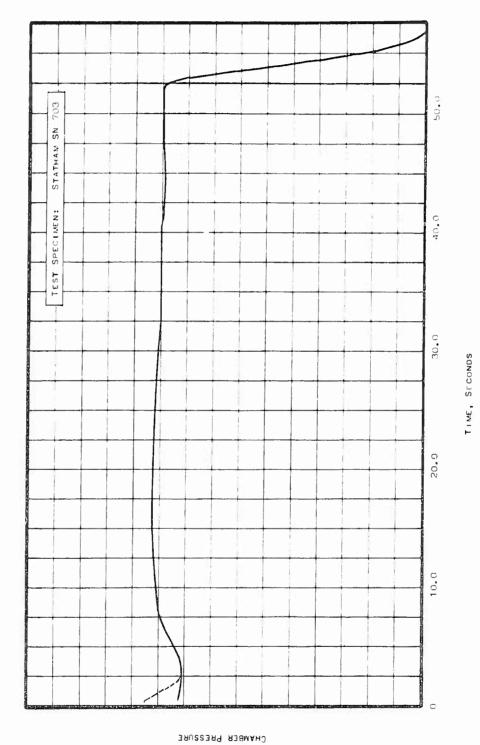


Figure 36



Pressure Amplitude-vs-Time, Transducer SN 703

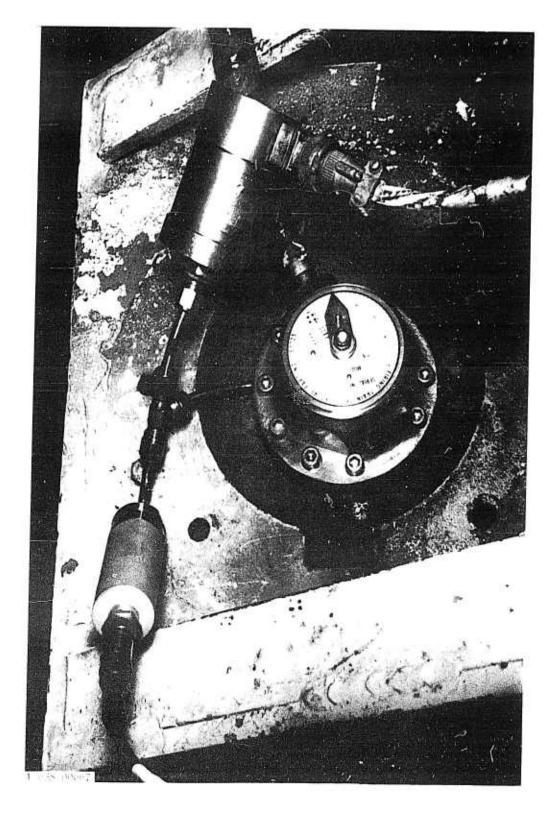


Figure 38

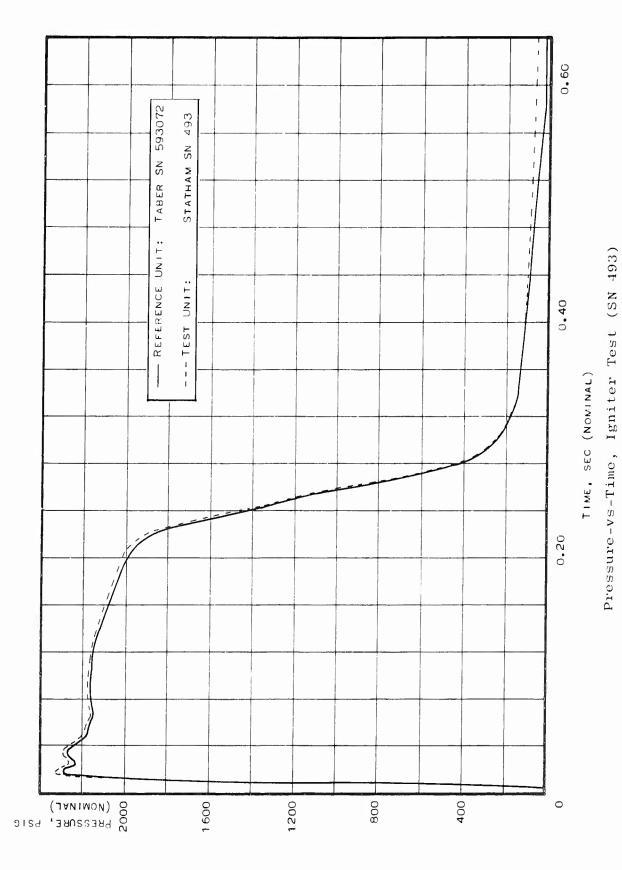
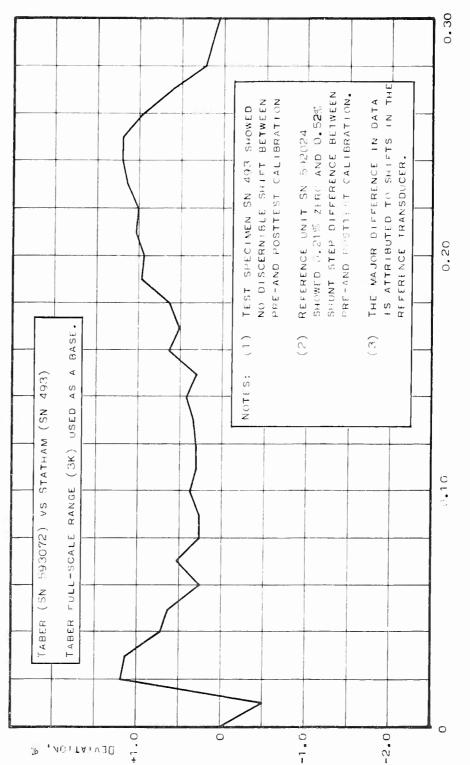


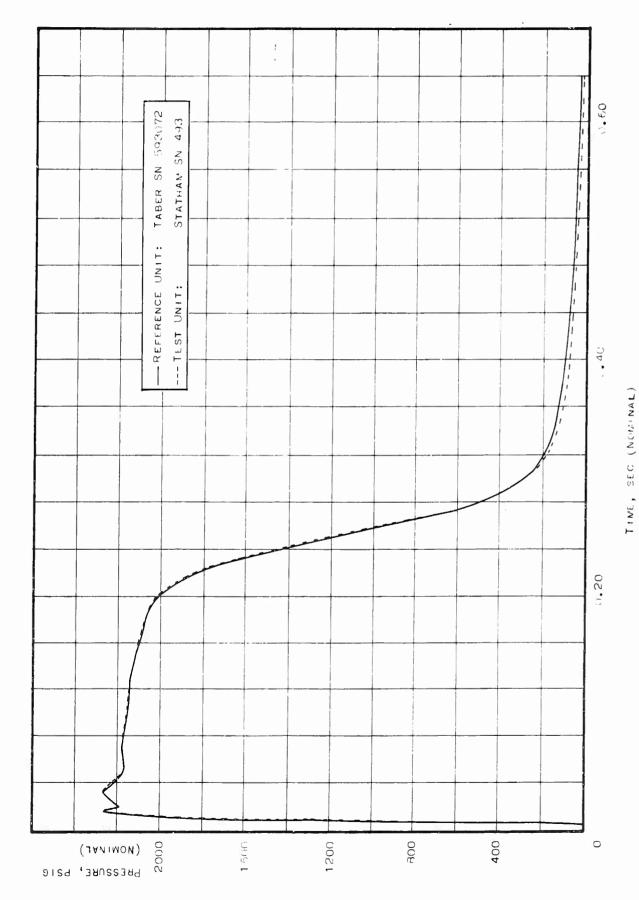
Figure 39



TIME, SEC (NONINAL)

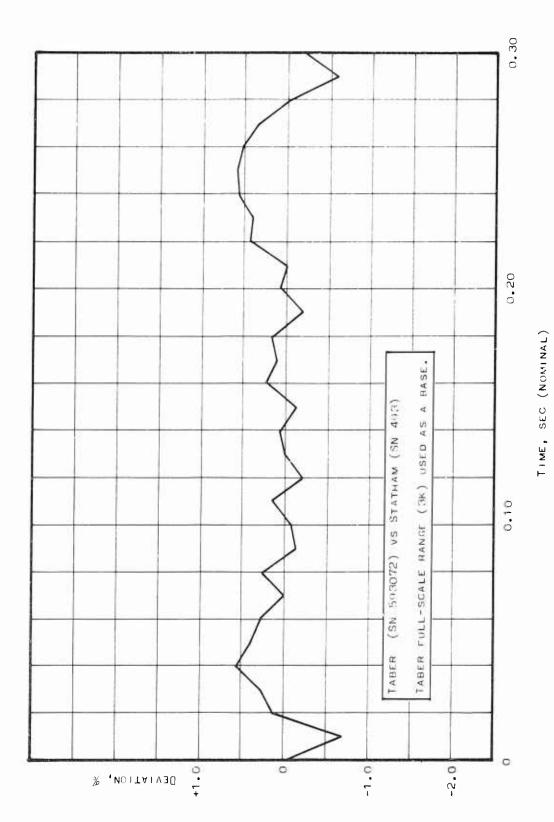
Percent Deviation-vs-Time, Igniter Test (SN 493)

Figure 40



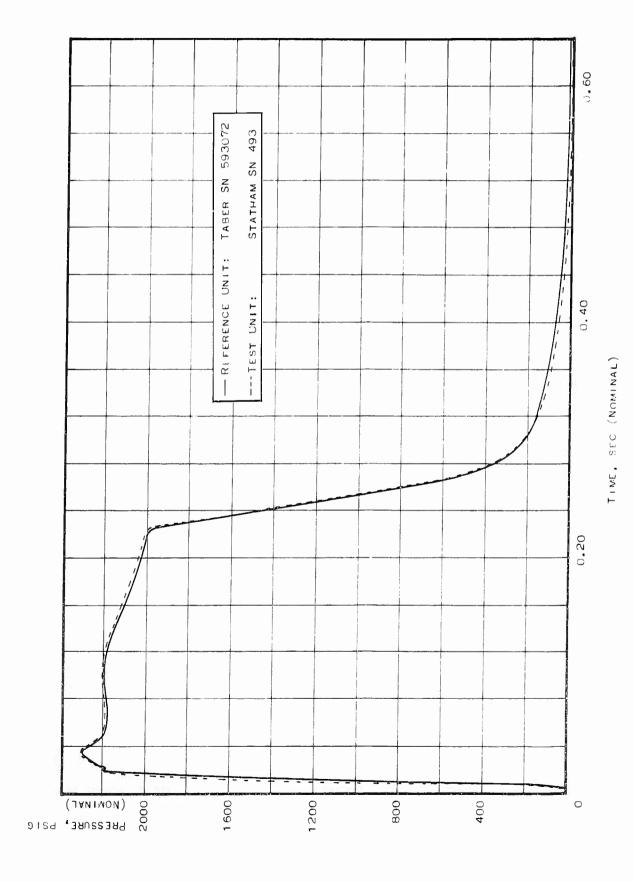
Pressure-vs-Time, Igniter Test (SN 493)

Figure 41



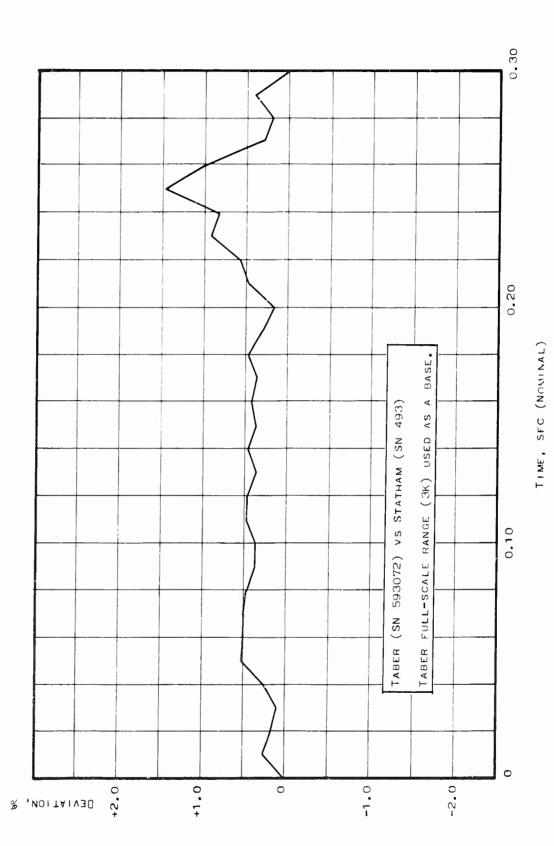
Percent Deviation-vs-Time, igniter Test (SN 493)

Figure 42



Pressure-vs-Time, Igniter Test (SN 493)

Figure 43



Percent Deviation-vs-Time, Igniter Test (SN 493)

Figure 44

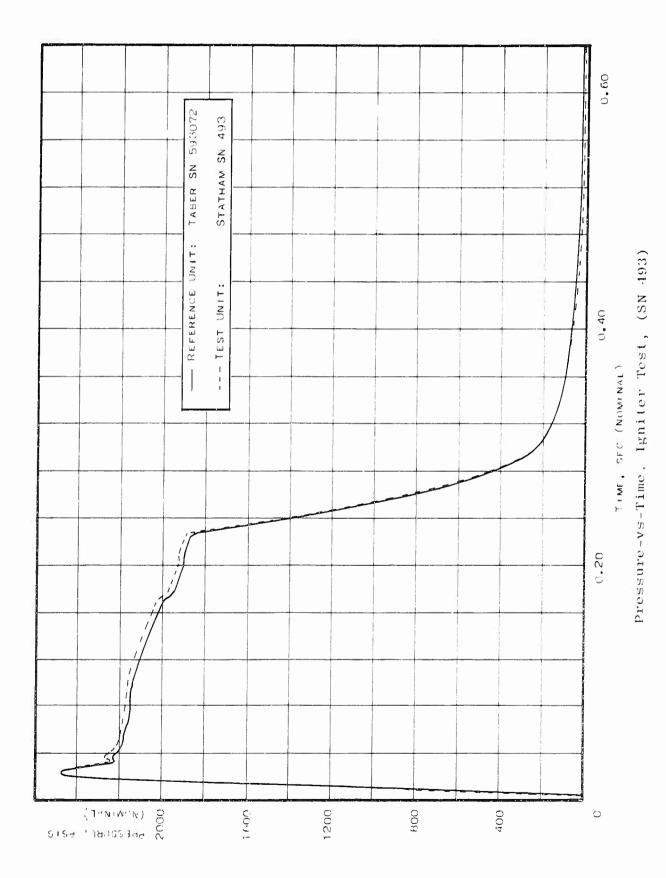
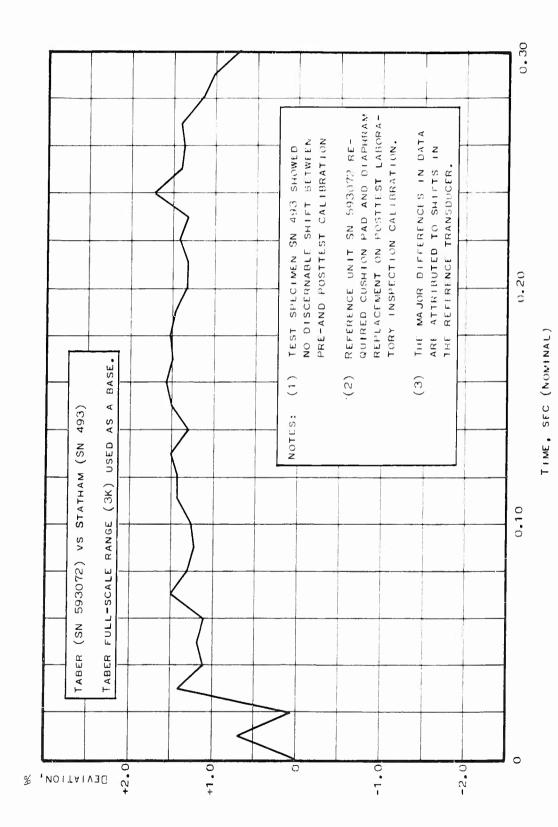
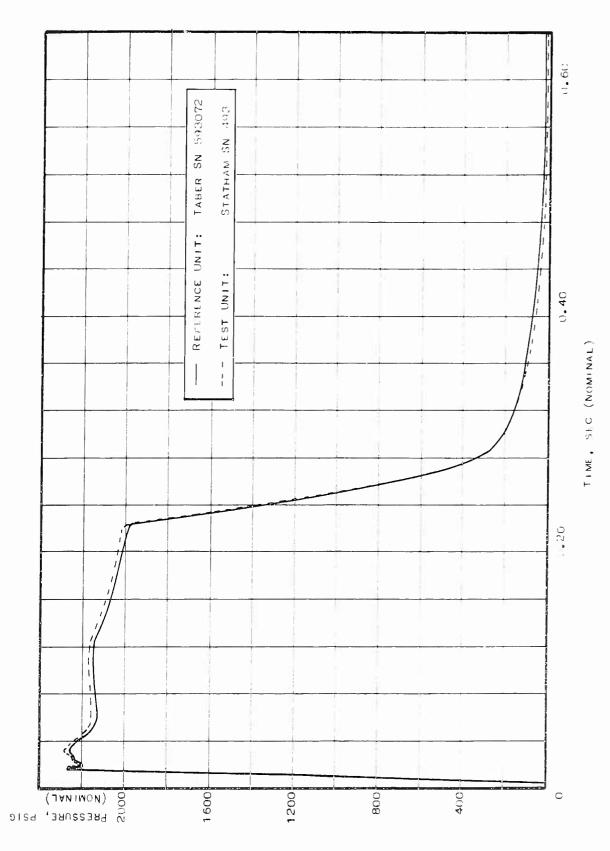


Figure 45

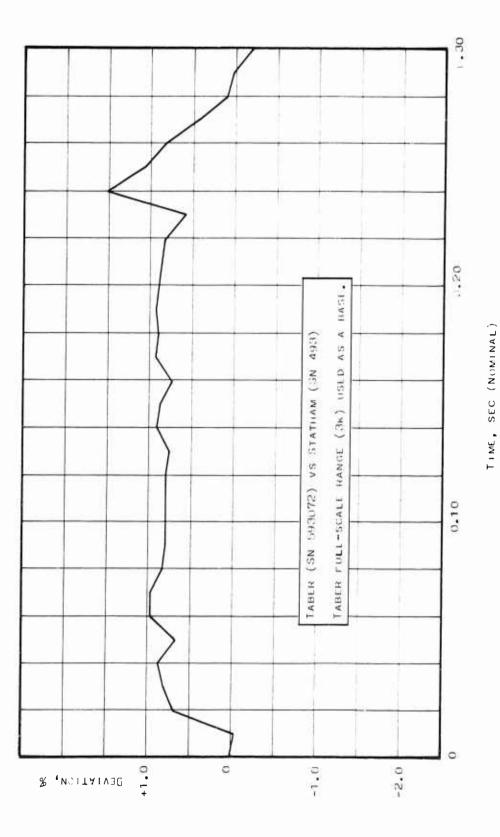


Percent Deviation-vs-Time, Igniter Test (SN 493)



Pressure-vs-Time, Igniter Test, (SN 493)

Figure 47



Percent Deviation-vs-Time, Igniter Test (SN 493)

Figure 48

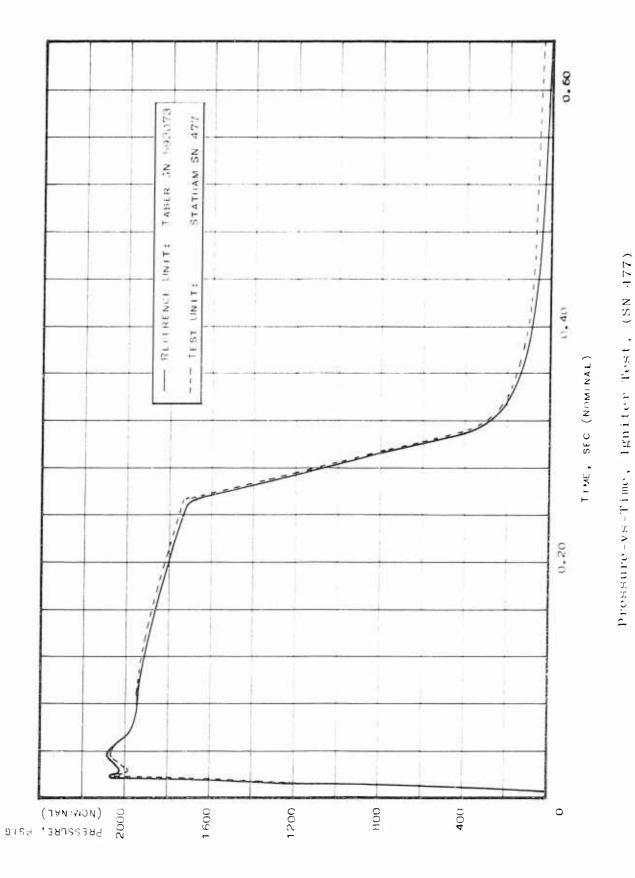
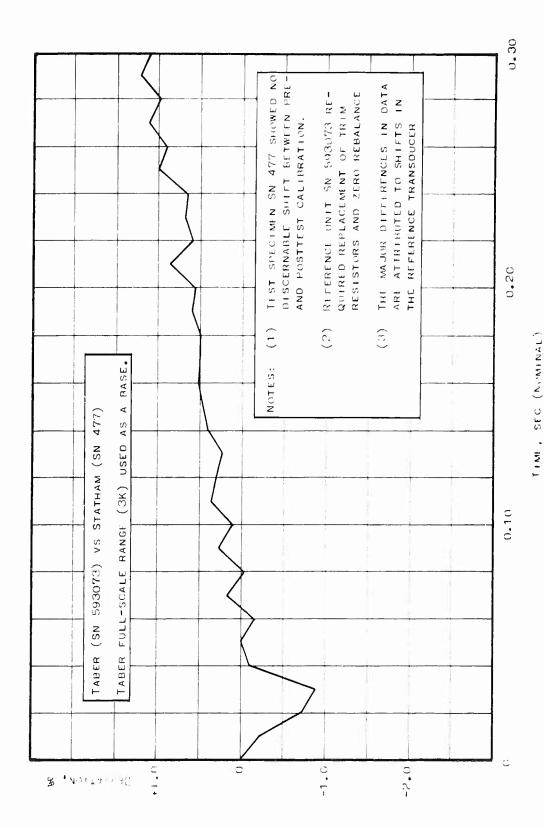


Figure 49



Percent Deviation-vs-Time, Egniter Test (SN 477)

Figure 50

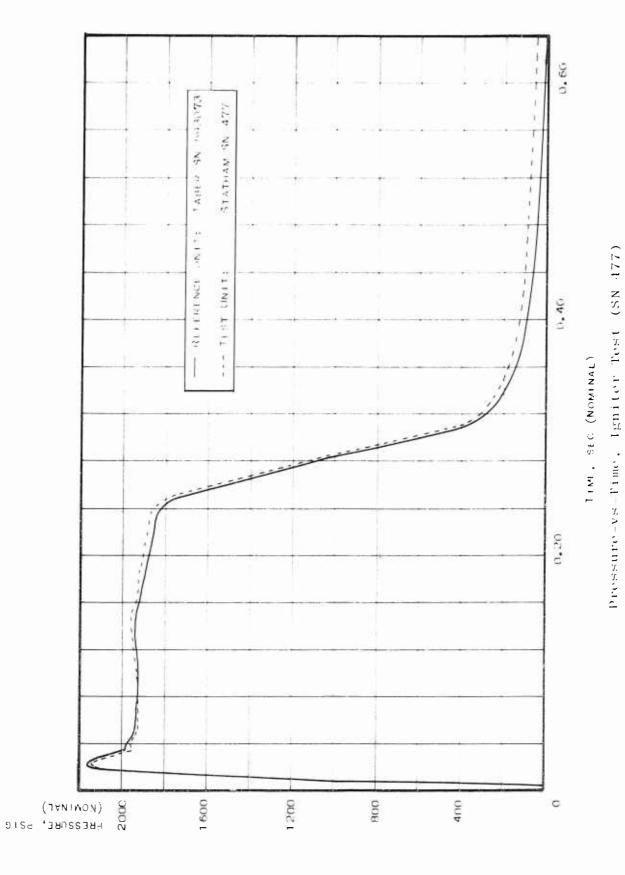
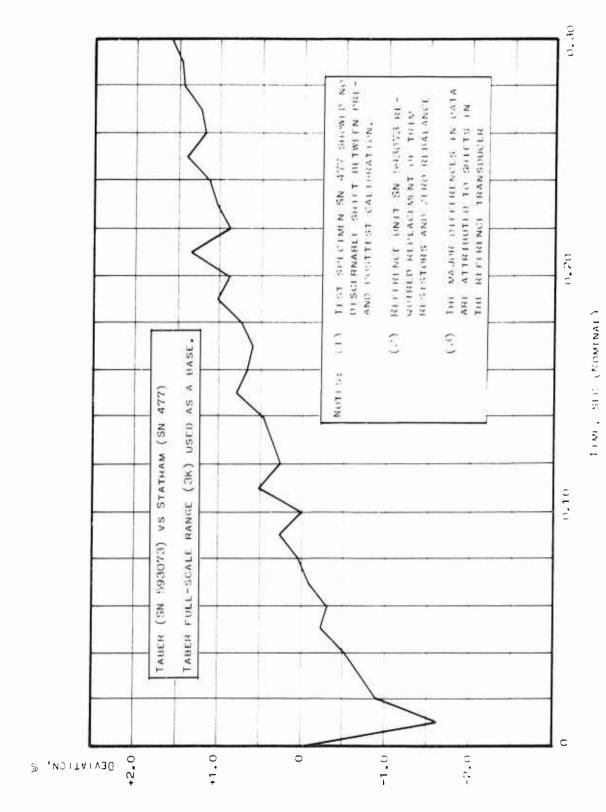
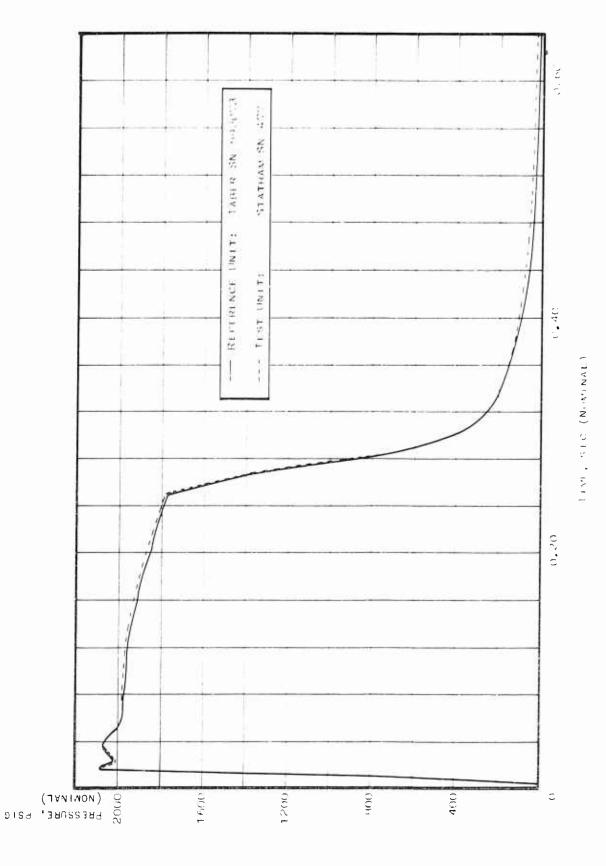


Figure 51



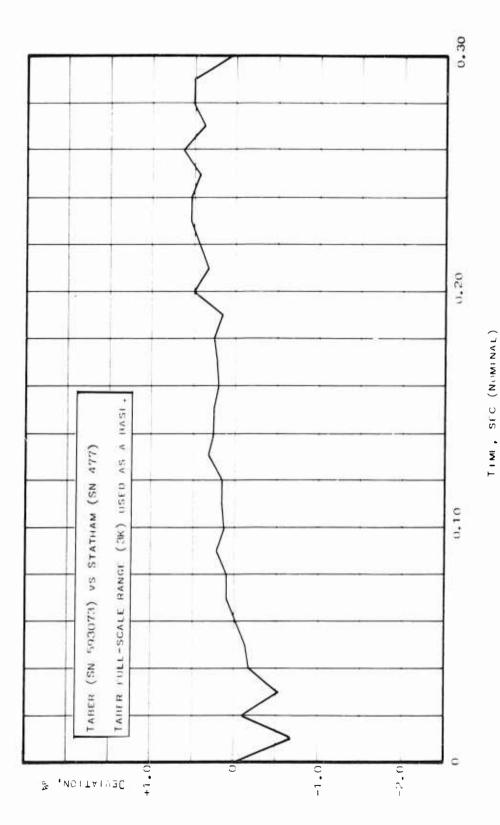
Percent Deviation-vs-Time, Igniter Test (SN 477)

Figure 52



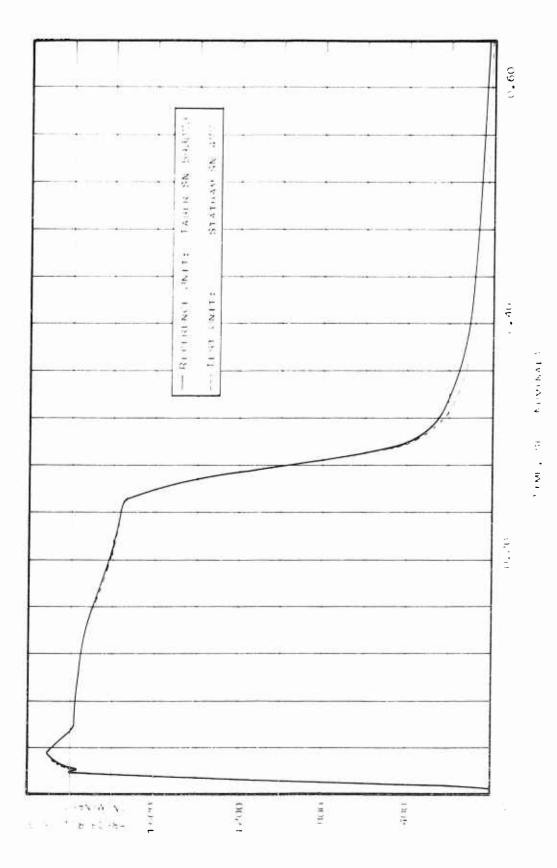
Pressure-vs-Time, Igniter Test (SN 477)

Figure 53



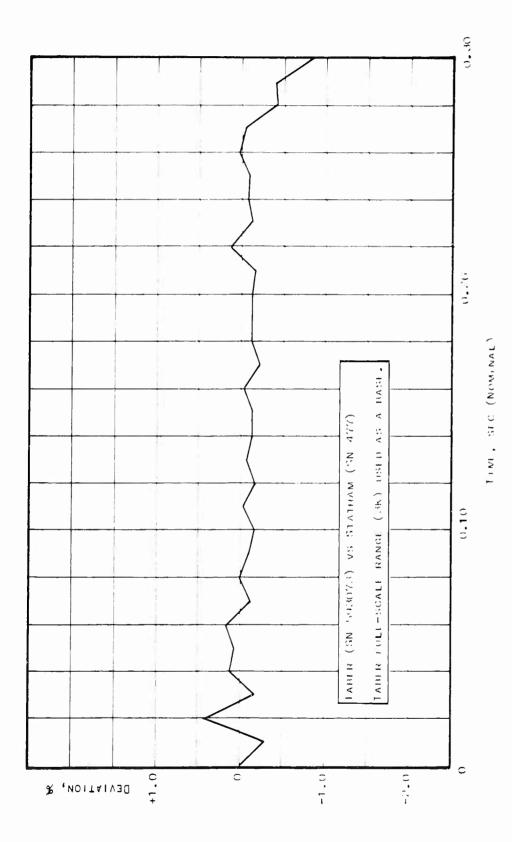
Percent Deviation vs Time, Igniter (SN 477)

Figure 54



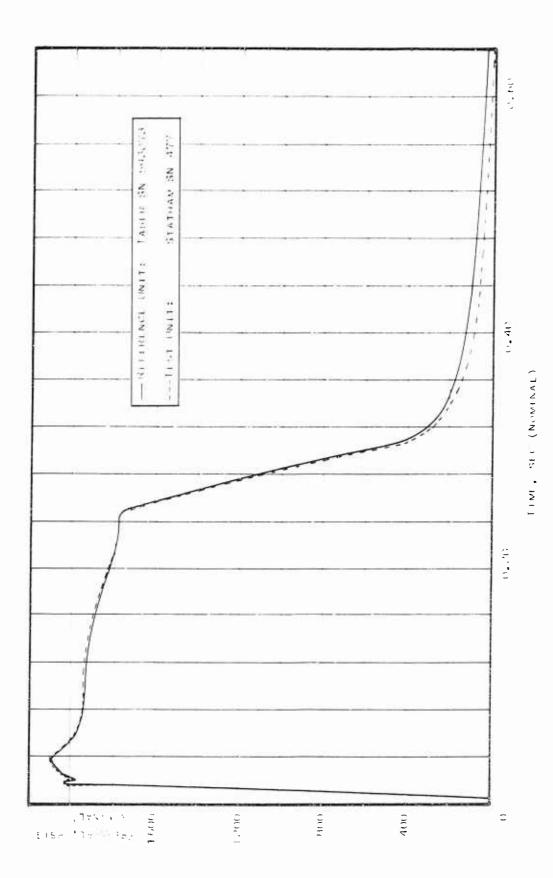
Pressure-vs Time, Igniter Test (SN 477)

Figure 55



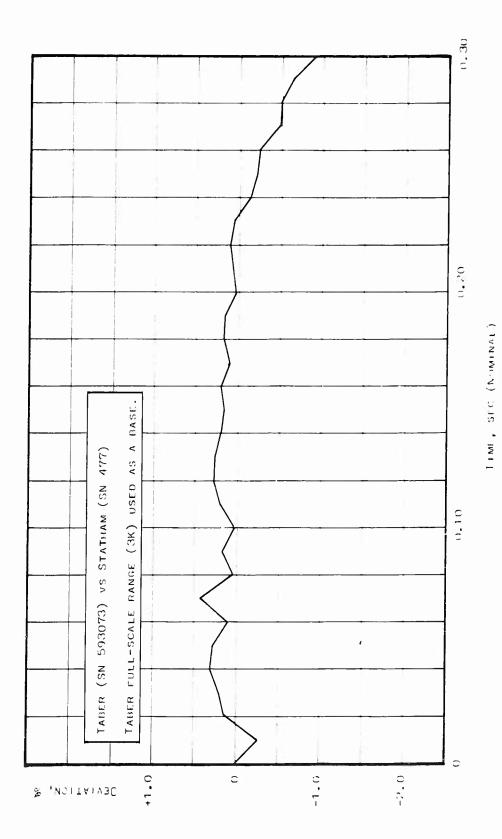
Percent Deviation-vs-Time, Igniter Test (SN 477)

Figure 56



Pressure-vs-Time, Igniter Fest (SN 477)

Figure 57



Percent Deviation -vs-Time, Igniter Test (SN 477)

Figure 58

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (57 OUTPUT)	AEROJET -GEMERAL CORPORATION 80LID ROCKET FLANT MINITEMAN OPERATIONAL PREESURE TRANSDUCER	Page 1 of 5
MFG. Statham	PHE-TEST CAL SERIAL NO. 493	
	CALIEWATED BY Dept. 8772	
	ASSIGNED TO ENGINE NO. PARAMETER 7.4 PM NO PARAMETER	
ACCEPTED (HOTE g)	CHECKED BY R	Dept. 8772
. VISUAL DESPECTION		
REMARKS	SHIPPINO, KANDLINO, PACKACINO, ETC.	
X ACCEPT		
II. CASE INSULATION	III. cræg	IT ISOLATION

TT.	CYDR	132.	ITWI TON

BETWEEN CASE & PINS	RESISTANCE IN MEGORES	TOLERANCE
A	10,0008	
В	10,000%	
С	10,000#	1 Magohm
ــــــــــــــــــــــــــــــــــــــ	10,000M	Minimon
E	10,700M	
F	10,700#	

BET FEEN PINS	RESISTANCE IN HEDOTHS	TOLERANCE	
A-D 4 B-C	10,000M	l Megohm Minimum	

I .002PT

X ACCEPT

PRIMARY POWER CURRENT

IV. IMERATIONEL CONTENT										
READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE							
41	70 MA Max.	25	2810,2VDC							

X ACCEPT

Pretest Calibration, Igniter Test (SN 493)

Page 2 of 5

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GEMERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 12-12-62
S/N 1.93

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 210 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUT FUT TH VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLIS	FULL SCALE OUT PUT IN VOLTS
62.5	5.038	6.759	7.50V HAXIMUM	72.4	5.052

X ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PRAK TO PEAK) READING @ F.S.	TOLEPANCE
13mv	25 MV MAXIMUM

ST 3083A DATE: 9-17-62 RANGE: 2500 FSIA ONLY

(5V OUTPUT)

AZROJET -OEMERAL CORPORATION SOLID ROCKET PLANT

MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

Page 3 of 5

12-12-62

DATE 493 3/H

ACCEPT

VII. LINEARITY, HYSTERESIS, REPEATABILITY 9 75 2 5°F (NOTZE 1 4 2)

PRESSURE	פדואי אן תיקדייס		LINEARITY HYSTER	HYSTERESIS	REPAT-	EXCITATION	ZZCITATION
(PSIO)	DECREASINO	INCREASING	TOLERANCE	TOLERANCE	ABLERYCE	VOLTAGE	TOLERANDE
0	577	377					
500	2016	22t	1340 2060	40 Unit Variation		287	
1000	1753	4137	39L0 4060				
1500	60.38	60.7	5940 6060	Variation			
2000	5038	4051	7940				
2500	10,000	1999.	I				
0	777.	976	I	40 Unit Variation	Maximum Deviation Prom Average of Three Cycles 20 Units	26.7	28 ± 0.2 700
500	5.15	5050	1940 2060				
1000	u137	2136	3940 4060				
1500	5544	5751	5940				
2000	² 041	F050	6060 7940 3060				
2500	10000	19965	I				
0	5.00	5000	r				
500	2^1"	2020	1940 2060				
1000	L132	L036	3940 4060	40 Unit Pariation		257	
1500	60L1	6048	5940 5060				
2000	8045	+050	7940 8060				
2500	10000	10000	7	,			

VIII. SHUNT CALIBRATION (NOTE 3)

1111. 5110111	U.T	(10.11)		
# OF FULL SCALE	75 .25°?	SHUNT TOLZRANCE	BICITATION VOLTAGE	fol
75	n# jo	7,475	287	28#9.2 700

ACCEPT

Χ ACCEPT

ACCEPT

ST 3083A DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT) AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT

Page 4 of 5

MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

12-12-62 493

8/1

IX. LINEARITY, HYSTERESIS, 0 30 2 5°F (NOTES 1 & 2)

PRESSURE (PSIO)	OUTPUT DECREASING	IN UNITS INCREASING	LINEARITI TOLERANCE	HYSTERES IS TOLERANCE	ETC IT AT TOM	VOLTAGE TOLERANCE
0	-16		I	İ		
500	1998	1992	1940 2060]		28 ±0.2
1000	7057	4015	3940 4060	ho Unit		
1500	6038	6031	5940 6060	Variation		
2000	8037	8030	7940]		
2500	10,000	9995	I			

ACCEPT

I. LINEARITY, HYSTERESIS, @ 150 2 5°F (NOTES 1 & 2)

PRESSURE	OUTPUT IN UNITS		LIMBARITY	HISTERES IS	EXCITATION	100 H AT 101	
(ESIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	POLTAGE	TOLERANCE	
0	-3		I				
500	200h	2000	1940 2060				
1000	1020	7011	1000 3940	40 Unit	28₹	88 ± 0.2	
1500	6031	6022	2000 2010	Variation			ADC
2000	8035	8030	7940 8060				
2500	10,000	9997	I				

ACCEPT

II. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	007F07 0 75±5°F	EXCITATION VOLTAGE	OUTPUT • 30±5°F	EXCITATION VOLTAGE	0सा है। 0 150±5 ग	ericitatio Voltage	TOTESTACE AOTH TOR
ZERO OUTPUT IN MILLIVOLT	A 43.3	28⊽	+53.2	287	+21.7	28₹	
ZERO OUT PUT TOLERANCE	-b +102mv	I	A.255 HV	I	A±85 mv	I	28 ± 0.2

MEROJET-OFFICIAL CORPORATION Page 5 of 5
SOLID ROCKET PLANT
HIDTEMAN OPERATIONAL
PRESSURE TRANSDUCER
12-12-62
L93

	(5V OUTPUT) SCALE OUTP	OT (HOTE 6)		8/11			
PUNOTION	007 P07	excitation voltage	007707 a 3025°7	EXCITATION VOLTAGE	007 PUT 015025°F	PICITATION TOLITATION	VOLTAGE TOLERANCE
P.S.OUT- PUT (PSIO) IN VOLTS	5.052	287	5.968	28 V	5.011	287	
MP (OVI)	.0698	287	.0859	28 V	.0529	267	28 2 0.2
CORRECTED F.S.OUTPUT IN VOLTS	ል 4.9822	28₹	4.982	28₹	4.958	28₹	VDC
P.S.OUTPUT COLUMN A	5 ± 0.1 ¥	x	A ± .055V	I	A ± .0857	I	

I ACCEPT

ST 3083A

DATE: 9-17-62 RANGE: 2500 PSIA ONLY

GENERAL NOTES:

- * all readings shall be taken at 75 15°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. I " not applicable.
- e. A 5-minute warmup time is required for each transducer.
- These calibration data sheets shall be used with the latest revision of Asrojet Galibration Procedure LCP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to exterials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

- 1. Balance transducer output to sero at atmospheric pressure, apply 2500 paig pressure and range type *C* calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer cutput to maro at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer sero output (test II) shall be recorded at 5.0 mm Hg or less.
- 5. Hegative voltage reading shall not be accepted at 75 5 T.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

RANGE: 25	.7-62 00 PSIA ONLI 5V OUTPUT)	801.ID NO HINUTEHAN		Page 1 of 5
MFG. Statham		_ SERIAL NO	POST-IGNITER FIRENOS 493 RANOB 0-250	nsia O
MODEL PA33	LTC-2.5M	CALIERATED BY	Dept. 8772 DATE 1-	16-63
ROOM TEMP.	75	ASS IONED	TO ENOING NO. For Igniter First	ng
BAROMETRIC PRES	SURCE	0 ми но	PARAMETER MEASTRED I	gniter Pressure
			CHECKED BY Ken Eushey Dept. 8772	
	CEPTED OTE g)		ASSIGNED BY R. E. Leeds	?
	PT E INSULATION EN RESISTANCE		III. CIRCUIT ISOLATION BETWEEN RESISTANCE	
CASE &	PINS IN MEGORINS	TOLERANCE	PINS IN MECORNS	3 1022102102
A	10,000M		A-D & B-C 10,000	l Megohm Minimum
В	10,000M		ACCEPT	
С	10,000M	1 Megohm Minimum	AUGEFI	
	10,000M			
B	10,000M			
P	10,000M			
X ACC	lpī			

IV. PRIMARY POWER CURRENT

	are installed to the contract of the contract							
i	READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE				
	40.5	70 NA Max.	28	28±0,2VDC				

X ACCEPT

Posttest Calibration, Igniter Test (SN 493)

Page 2 of 5

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 1-16-63
S/N 493

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

BEFORE O	BEFORE OVERPRESSURE PSIG READINGS		BSURE) PSIA	FOR REFERENCE ONLY AFTER OVERPRESSURE PSIO READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUT PUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUT PUT IN VOLTS
82.4	5.964	6.795	7.50V MAXIMUM	79.2	5.063

X ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
13 mv	25 MV MAXIMUM

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA OHLI (5V OUTPUT)

AZROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

Page 3 of 5 1-16-63 DATE 493 3/<u>N</u>

PRESSURE		IN THITS	LINEARITY		REPEAT - ABILITY TOLTRANCE	EXCITATION VOLTAGE	AOLI VOR SXC LLY, LO			
(PSIO)	DECREASING	INCREASINO	TOLERANCE	TOLERANCE	TOLFLANCE	AOEI VOE	TOLERANCE			
0	-3		I							
500	2010	2001	1940 2060							
1000	F058	4020	3940 4060	40 Unit		227				
1500	6040	6033	5940 6060	Variation						
2000	6037	8033	7940 2060]						
2500	10,000		I							
0	-3		I		Maximum Deviation From Average of Three Cycles		28 ± 0.2			
500	2008	2006	1940 2060							
1000	4026	F05F	3940 4060	lo mat		257				
1500	6038	6033	5940 6060							
2000	9038	1 033	7940 8060							
2500	10,000	12020	I		20 Units					
0	-3		r		ľ					
500	2005	2004	1940 2060							
1000	4026	L021	3940 4060	40 Unit Variation		287				
1500	6037	6030	5940 6060							
2000	8035	8033	7940 8060							
2500	10000	11793	ı							

ACCEPT

ACCEPT

ACCEPT

VIII. SHINT CALIBRATION (NOTE 3)

1	ITIT. DUNKE	CALIDAR TOR	(3015))		
	% OF FULL SCALE	75 : 5°F	SHUMT TOLERANCE	RXCITATION VOLTAGE	TOL
	75	- de	7,475	26	28 2 20.2

ACCEPT

Posttest Calibration, Igniter Test (SN 493)

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(57 OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 4 of 5

1-16-63 DATE

493 3/M

LINEARITY HYSTERESIS & 20 1 5°F (MOTES 1 & 2)

PRESSURE	OUTPUT	in Units	LINEARITY	HISTERESIS	RECORD RICITATION	VOLTAGE TOLERANCE
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	YOLFACE"	TOLERANCE
0	2	0	I			
500	2903	2010	1940 2060			
1000	4030	4033	3940 4060	40 Unit	257	28 10.2 VDC
1500	5040	6015	5940 6060	Variation	2,7	
2000	t036	A 7.42	1940 2060			
2500	10,000	9007	I			

X ACCEPT

I. LINEARITY, HYSTERESIS. @ 150 2 5°F (MOTES 1 & 2)

PRESSURE	OUTPUT IN UNITS		LINEARITY	HYSTERES IS	RECORD EXCITATION	EXCITATION
(BIG)	DECREASING	INCREAS ING	TOLERANCE	TOLERANCE	YOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	-5	-2	I			
500	2109	2100	1940 2060			
1000	7050	u112	3 <i>9</i> 40 4060	40 Unit	hO Unit 287	28 ± 0.2
1500	5034	5023	6060 5 <i>9</i> 40	Variation		
2000	5034	5030	7940 8060			
2500	10,000	9008	I			

ACCEPT

II. ZERO OUTPUT (NOTES 1 & 5)

funct ion	0077907 9 75.25°F	EXCITATION VOLTAGE	007P07 8 3025°F	EXCITATION VOLTAGE	9 150±5 7		TOLERANCE TOLERANCE
ZERO OUT PUT IN MILLIVOLT	A +100.7	28 V	59.7	287	27.2	257	
ZERO OUT PUT TOLERANCE	-р <102н√	I	A255 EV	I	4±85 mv	X	28 ± 0.2 VDC

AMROJET -GENERAL CORPORATION SOLID ROCKET PLANT Page 5 of 5

3/N_

MINUTENAN OPERATIONAL PRESSURE TRANSDUCER DATR 1-16-63

DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

ST 3083A

(SV OUTPUT)

PUNOT ION	001 PU1 0 75-5°F	excitation voltage	001701 • 3025°F	EXCITATION VOLTAGE	OUT PUT 015025°F	AOTI VOE EXCLUSI ION	VOLTAGE TOLERANCE
P.S.OUT- PUT (PSIG) IN VOLTS	5.057	28	£,977	28	5.025	28	
ZERO OVI	.0759	28	.9883	28	.0561		28 ± 0.2
CORRECTED F.S.OUTPUT IN VOLTS	4.9681	28	4.9597	25	1.9600	28	₹DC
P.S.OUTPUT COLUMN A TOL	5 ± 0.1 ¥	ı	A 2 .055V	ı	▲ : .085V	x	

X ACCEPT

GENERAL NOTES:

- a. All readings shall be taken at 75 2 5°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. I = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- These calibration data sheets shall be used with the latest revision of Asrojet Calibration Procedure ACP A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to zero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer sero output (test XI) shall be recorded at 5.0 mm Hg or less.
- 5. Hegative voltage reading shall not be accepted at 75 2 5 7.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY MEROJET-OFMERAL CORPORATION Page 1 of 5 SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER (57 OUTPUT) P.O.# PPE-TEST CALIBRATION MFO. Statham SERIAL NO. L77 RANGE 1-2500 beis MODEL PASSATC-2.5M CALIERATED BY Dept. 8772 DATE 1-16-63 ASSIGNED TO ENGINE NO. Pre-test calibration ROOM TEMP. 75 _ 77 759.0 MM HO PARAMETER MEASURED Igniter Pressure BAROMETRIC PRESSURE _ CHECKED BY Ken Bushey ASSIGNED BY R. E. Leeds ACCEPTED (NOTE g) I. VISUAL INSPECTION NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC. ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHIAS	TOLERANCE
A	10,000M	
В	10,000M	
С	10,000M	1 Magoha
	10,000%	Minimus
E	10,000M	
F	10,000	

III. CIPCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEDIORNS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

ACCEPT

X ACCEPT

IV. PRIMARY POWER CURRENT

111 11111111	TONIAL COME	817	
READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
42.5	70 MA Max	28	28±0.2VDC

ACCEPT

Pretest Calibration, Igniter Test (SN 477)

Page 2 of 5

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT) AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

DATE 1-16-63
S/N 477

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIO READINGS		OVERPRESSURE 3750 ±10 PS IA			FOR REFERENCE ONLY AFTER OVERPRESSURE PS IO READINGS		
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUT PUT IN VOLTS	FULL SCALE OUT PUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUT PUT IN VOLTS		
62.7	5.067	6.77և	7.50V MAXIMUM	60.5	5.070		

X ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
15 m v	25 MV MAXIMUM

ST 3083A DATE: 9-17-62 RANGE: 2500 PSIA ONLY

(5V OUTPUT)

AEROJET-GENERAL CORPORATION SOLID ROCKET PLANT HIRUTEMAN OPERATIONAL PRESSURE TRANSDUCER

Page 3 of 5 1-16-63 DATE 477

ACCEPT

3/<u>N</u>

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 \$ 5°F (NOTES 1 4 2)

PRESSURB		ETINU NI	LINEARITY	HYSTERES IS	REPEAT -	EXCITATION	EXCITATIO VOLTAGE
(PSIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	TOLEANCE	VOLTAGE	TOLERANCE
0	-3		X		ĺ		
500	2000	1978	1940 2060			267	
1000	7005	3982	760 760	40 Unit			
1500	6002	5975	5940 6060	Variation			
2000	8204	7987	7940 8060				
2500	10,000	10000	I				
0	-3		I				28 ± 0.2
500	1999	1978	1940 2060		Maximum	205	
1000	4001	3986	3940 4060	40 Unit	Deviation From		
1500	6001	5980	5940	Variation	Average of Three	287	
2000	8003	7988	6060 7940 8060	Cycles			
2500	10000	10000	X		20 Units		
0	-3		X				
500	1998	1980	1940 2060				
1000	1,000	3985	3940 4060	bo Unit 297	287		
1500	6000	5983	5940				
2000	8003	7988	7940 8060				
2500	10000	10000	x				

VIII. SHUNT CALIBRATION (NOTE 3)

TATAL DI	ONI CALLED BULLEON	(4014))		
S OF FULL SCA	18 75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7501	7,475 7,525	28₹	28±0.2 VDC

ACCEPT

ACCEPT χ

ACCEPT

Pretest Calibration, Igniter Test (SN 477)

ST 3083A

DATE: 9-17-62 RANGE: 2500 PSIA ONLY (5V OUTPUT)

AKROJET-GENERAL CORPORATION SOLID ROCKET PLANT MINUTEMAN OPERATIONAL PRESSURE TRANSDUCER

Page 4 of 5 1-16-63 DATE

3/N_

IX. LINEARITY, HYSTERESIS, 6 30 2 5°F (NOTES 1 & 2)

PRESSURE (PSIO)		IN UNITS INCREASING	LINEARITI TOLERANCE	HISTERES IS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE	
0	0	7	I				
500	2713	1975	1940 2060				
1000	LY35	397)	3940 4060	40 Unit	287	28 ±0.2	
1500	6002	5970	5940 6060	Variation		∀DC	
2000	⁸ 003	79 ⁶ 7	7940 8060				
2500	10,000	11003	I				

ACCEPT

LINEARITY, HYSTERESIS. @ 150 2 5°F (NOTES 1 & 2)

PRESSURE	OUTPUT IN UNITS DECREASING INCREASING		LINEARITY	HYSTERESIS	RECORD EXCITATION	EXCITATION
(PSIG)			TOLERANCE	TOLERANCE	ROLLION	VOLTAGE TOLERANCE
0	-2	-2	ı			
500	1994	1972	1940 2060		Unit 257 28	
1000	3998	3971	3940 4060	40 Unit		28 ± 0.2
1500	6วาก	5972	5940	Variation	· · ·	∀DC
2000	8002	79 ⁹ 3	7 <i>9</i> 40 8060			
2500	10,000	SOCA	I			

ACCEPT

II. ZERO OUTPUT (NOTES & & 5)

FUNCTION	OUTPUT @ 7525°F	EXCITATION VOLTAGE	007P07 © 3025°F	EXCITATION VOLTAGE	0 150 25 °F	VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUT PUT IN MILLIVOLT	29.7	28₽	27.5	5¢.1	-2=	28	
ZERÓ OUT PUT TOLERANCE	-b +102mv	I	A255 mv	I	A±85 mv	I	28 ± 0.2 VDC

DATE: 9-17-62

RANGE: 2500 PSIA ONLY

MEROJET-CENERAL CORPORATION SOLID POCKET PLANT MINUTEMAN OPERATIONAL

Page 5 of 5 1-14-63 DATE

PRESSURE TRANSDUCER

477 S/N

(5V OUTPUT) S/N 1/7 II. FULL SCALE OUTPUT (NOTE 6)									
FUNCT ION	007 P07 0 75-5°F	EXCITATION VOLTAGE	00TPUT • 3025°7	EXCITATION VOLTAGE	OUT PUT @15025°F	EXCITATION VOLTAGE	VOLTAGE TOLERANCE		
P.S.OU?- PUT (PSIG) IN VOLIS	5.765	28	5.062	28	5.033	28			
ZEBO OUT - IN VOLTS	. 7559	2 ^p	.0562	28	+.2037	28	28 ± 0.2		
CORRECTED F.S.OUTPUT IN VOLTS	Å 5.0091	28	5.0058	28	5.0293	28	₹DC		
P.S.OUTPUT COLUMN A	5 ± 0.1 V	I	A ± .055V	I	A ± .0857	I			

X ACCEPT

ST 3083A

GENERAL HOTES:

- a. All readings shall be taken at 75 15°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 1 0.2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. X = not applicable.
- e. A 5-minute warmup time is required for each transducer.
- f. These calibration data sheets shall be used with the latest revision of Asrojet Oslibration Procedure ACF A-2416.
- g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepent transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST WOTES:

- 1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer output to zero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer zero output (test II) shall be recorded at 5.0 mm Mg or less.
- 5. Negative voltage reading shall not be accepted at 75 ± 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

ST 3033 DATE: 7-2-62 RANGE: 2500 PSIA (5V OUTPO	ONLY	AEROJET-GI SOLID MINUTEM PRESSUI	ROCKET AN OPERA	PLANT TIONAL	Pos!		Page 1 of 5 ALIBRATION R 4184
MFG. Statham		SERIAL NO)	7	R	ANGE	2500 psia
MODEL PA 334TC		CALIBRATE	ED BY	Dept. 87	72	DATE	1-23-63
ROOM TEMP. 75	• F	ASSIC	OT CEN	ENGINE NO	Ign:	lter Fir	ings
BAROMETRIC PRESSUR	æ <u>761.</u>	1 MM HO	}				
TRANSDUCER SHOULD MRB ACCEPT IR #	TED	ACCEPTE REJECTE	2D 2D	PREPARED B	ng K.	. W. Bus Der Dept	hey
	X ACCE	ana .					
II. CASE I	NSULATION	SPT	L REJE	III.		IT ISOL	
II. CASE I BETWEEN CASE & PINS	NSULATION RESISTANCE	TOLERANCE	resu	HETWI	EEN NS	RESISTA IN O	INCE TOLERANCE
BETWEEN	NSULATION RESISTANCE	<u> </u>	L REJI	HETWI	EEN NS	RESISTA	INCE TOLERANCE
BETWEEN CASE & PINS A B	NSULATION RESISTANCE IN OHMS	<u> </u>	rej	HETWI	een ns k B-C	RESISTA IN OR	TOLERANCE 1 Megohm Minimum
BETWEEN CASE & PINS A B C	NSULATION RESISTANCE IN OHMS 10 KM	<u> </u>	rej	HETWI	EEN NS	RESISTA IN OR	ANCE TOLERANCE
BETWEEN CASE & PINS A B C	NSULATION RESISTANCE IN OHMS 10 KM 10 KM	TOLERANCE 1 Megohm	rej	HETWI	een ns k B-C	RESISTA IN OR	TOLERANCE 1 Megohm Minimum
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BETWEEN CASE & PINS A B C D	NSULATION RESISTANCE IN OHMS 10 KM 10 KM 10 KM 10 KM 10 KM 10 KM 10 KM 10 KM 10 KM	TOLERANCE 1 Megoha Minimum T	R CURREN	III. BETWIN	EEN NS LE B-C ACCEPT	RESISTA IN OR	TOLERANCE 1 Megohm Minimum
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Posttest Calibration, Igniter Test (SN 477)

ST 3083
DATE 7-2-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ADOKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-23-63

S/N 477

Page 2 of 5

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		BEFORE OVERPRESSURE 3750 10 PSIA PSIG READINGS		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
65.2	5.067	6.746	7.50V MAXIMUM	65.9	5.065

ACCEPT REJECT

VL RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE		
20 MV	25 MV MAXIMUM		

ACCEPT REJECT

JACE PANGS	a vai		ar tva G	an Carrier Entral	DATE	1-23-63	*
	יארטס עצ)	51	10 61	STUDIO BR	. 9/N	477	
ntrustas.	অসং, ফাডালান	· · · · · · · · · · · · · · · · · · ·	೯೯೬೨೮೪ ಆ 75	i C'7 (NOTES	1 & 2)		
(2.2.1)	5,11		TUNE STY	HY3TERESIS		ZXCITATION	VOLTAGE TOLERANCE
3	U		λ			•	
1 11	2002	1977	10.00	(1)			
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1 100	6007	5986	James Comment	Turiation	:		
27.19	8007	7991		1			
950	: 10,000	10001	· Y				} -
0	0		χ .				
500	2000	1978	1910 - 2060 -	1	Maximum		e:
1000	4005	3988	3940 • 4050	40 Unit	Deviation From	28	28 ± 2
1500	6005	5983	5940	· Variation	Average of Three		VDC .
2000 :	8005	7992	791.0 8060	1	Cycles		
_ 2500	10001	10001	. Х		20 Units		
0 ,	• 0 .	•	X : i	- 4		11.4	
500	2000	1980	1940 2060				
1000	4006	3988	· 3940 4060	40 Unit		28	
1500	6006	5985	5940 6060 ' '	· Variation	.0		·
2000 -	8006	7993	7946 8060		23 (1.5.		ĺ
2500	10001	10000	χ				
а [LINEARITY ACCEPT	· 14	· · · ·	STERESIS CCEPT	,	C. FEPZATAB	ILITI
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		II.SHUNT CAL;			XCITATION		
		ULL SCALE		TOLERANCE V	OLTAGE	ML 2040	
		75	7496	7,475 7,52 5	• 28	VDC VDC	
		ACCEPT	REJECT				

Posttest Calibration, Igniter Test (SN 477)

DATE 7-2-62 SANGE: 2500 1 (50 (נוי וידא מווי וידא	T-OPTIERAL CON LID FOCKET PI TEMAN OPERATI SSURG TRANSDI	ANT DAY		
		3		5/1		,
TY . LINI	earity, ģyste	ERESIS. @ 30	± 5°F (NOTES	142)		
1 RESSURE	OUTPUT	פדותי חו	LINEARITY	HYSTERESIS	RECORD EXCITATION	WELLETION .
(RIG)	DECREASING	INCREASING	TOLERANCE	TOLERANCE	ETGLTAGEON	TOLERANCE
0	. 0		1940			
500	2000	1975	2060		A	
1000	4000	3970 ,	3940 4060	40 Unit	- 28	28 ± 2
1500	5999	'5970	5940 6060	Variation		VDC
2000	8002	79841	7940 8060			1
2500,	10,000	10000	I			=
PRESSURE		ETINU MI	LINEARITY	HYSTERESIS	RECORD EXCITATION	EXCLTATION
(PSI3) 0	DECREASING	INCREASING	TOLERANCE			I VULTAUD I
		٠,	Υ	TOLERANCE	VOLTAGE	TOLERANCE
500	0	•	X 1940	TOLERANCE	VOLTAGE	TOLERANCE
	2000	1972	1940 2060	IOLEMACE	VOLTAGE	TOLERANCE
1000		1972 3972	1940 2060 . 3940 4060	40 mit	VOLTAGE 28	TOLERUNCE
1000	2000		1940 2060 . 3940 4060 5940		VOLTAGE 28.	TOLERANCE
	2000	3972 ^	1940 2060 . 3940 4060	40 mit	VOLTAGE 28	TOLERANCE
1500	2000 14003 6003	3972°	1940 2060 3940 4060 5940 6060	40 mit	VOLTAGE 28	TOLERANCE
2000 2500 X ACCEPT.	2000 14003 6003 5006 10,000	3972° -5974 -7.989 -10000	1940 2060 3940 4060 5940 6060 7940 8060	40 mit	VOLTAGE 28.	TOLERANCE
1500 2000 2500 XI. ZEFO	2000 4003 6003 5006 10,000 REJECT OUTPUT (NO	3972	1940 2060 3940 4060 5910 6060 7940 8060 1	LO Unit Variation	28.	28 ± 2 VDC
2000 2500 XI. ZEFO FUNCTION EERO OUTFUT	2000 4003 6003 6006 10,000 REJECT OUTPUT (NO DUTPUT EX 75±5*F VO A	3972	1940 2060 3940 4060 5940 6060 7940 8060 1	ATEN OUTPU	zg. Excitation 25°F Voltage	TOLERANCE
1500 2000 2500 XI. ZEFO FUNCTION CONTROL N MILLIULT 2550	2000 14003 6003 8006 10,000 REJECT OUTPUT (NO OUTPUT EX 775±5*F VC	3972	1940 2060 3940 4060 5940 6060 7940 8060 1	ATEN OUTPU OB 0 150	28. EXCITATION 5°F VOLTAGE 28	28 ± 2 VDC

Posttest Calibration, Igniter Test (SN 477)

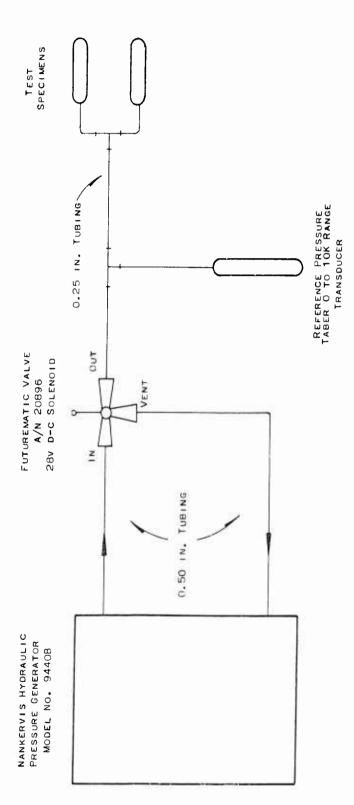
ACCEPT REJECT

AEROJET GEMERAL COMPURATION Page 5 of 5 SOLID ROCKET PLANT MINUTEMAN OF TRATIONAL ST 3083 1-23-63 DATE 7-2-62 DATE FANGE: 2500 PGIA ONLY (5V OUTPUT) PRESSURE TRANSDUCER s/N FULL SCALE OUTPUT (NOTE '6) EXCITATION EXCITATION VOLTAGE TO LERANCE EXCITATION OUTPUT EXCITATION OUTPUT OUTPUT FUNCTION 075±5°F VOLTAGE 030±5°F VOLTAGE @150±5°F -דעס פתאב PLTATRA 28 5:066 28 5.067 5.036 28 PAS-AGUZ-2500 PSIG .0640 28 .0618 28 .0120 28 ± 2 VDC TILL, SCALE 5.0020 28 5.0052 28 5.0240 28 F.S. OUT-FUT COLUMN A TOL. 5 ± 0.17 A ± 85MV 4 ± 55MV I REJECT ACCEPT

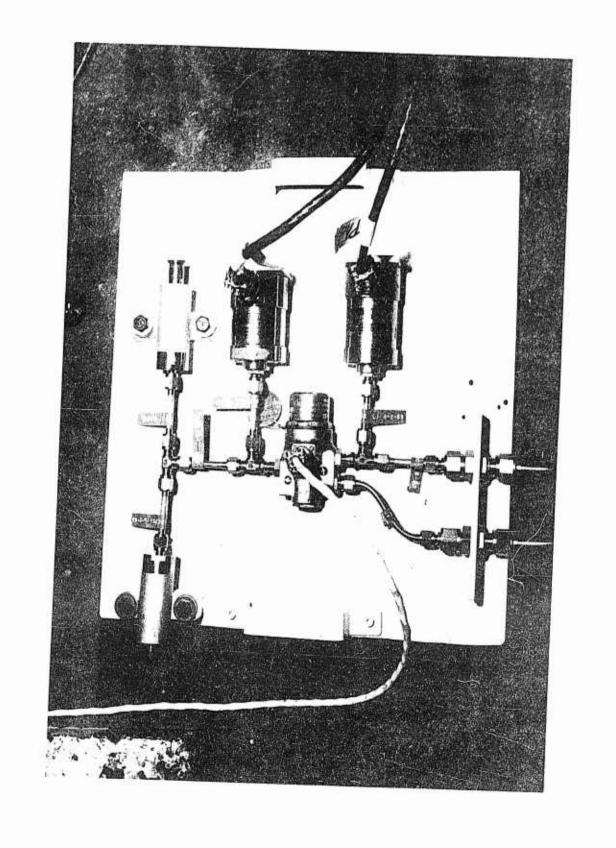
GENERAL NOTES:

- a. All readings shall be taken at 75 ± 5°F unless otherwise specified.
- b. The transducer excitation voltage shall be 28 ± 2 VDC.
- c. 10,000 units shall equal 100% full scale transducer reading.
- d. X = not applicable.
 e. A 10-minute warmup time is required for each trensducer.
 f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416
 SPECIFIC TEST NOTES:
- 1. Balance transducer output to zero at atmospheric pressure, apply2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.
- 2. Linearity tolerance applies to increasing portion of pressure cycle only.
- 3. Balance transducer cutput to zero at atmospheric pressure for shunt calibration.
- 4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.
- 5. Negative voltage reading shall not be accepted at 75 ± 5°F.
- 6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

2. But I to be surformed by AGC Receiving and Inspection Department.



Safety Reliability Test Setup Schematic



View of Safety Reliability Test Setup Figure 64